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AVIATION AND AIRCRAFT JOURNAL

Astra-19 at the Buc Air Meet

VOLUME IX
Number 9

SPECIAL FEATURES

THE SPERRY MESSENGER AIRPLANE
A GERMAN DIESEL AIRPLANE ENGINE
THE NEW HANDLEY PAGE WING
U. S. ARMY AIR SERVICE
TESTS OF AEROMARINE WING STRUCTURE

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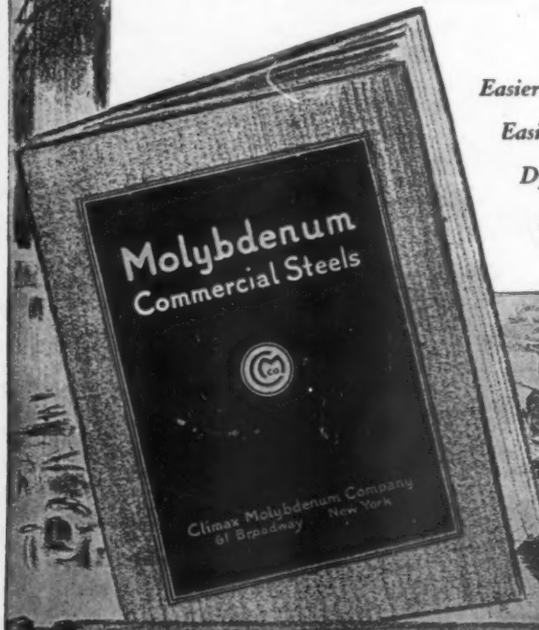

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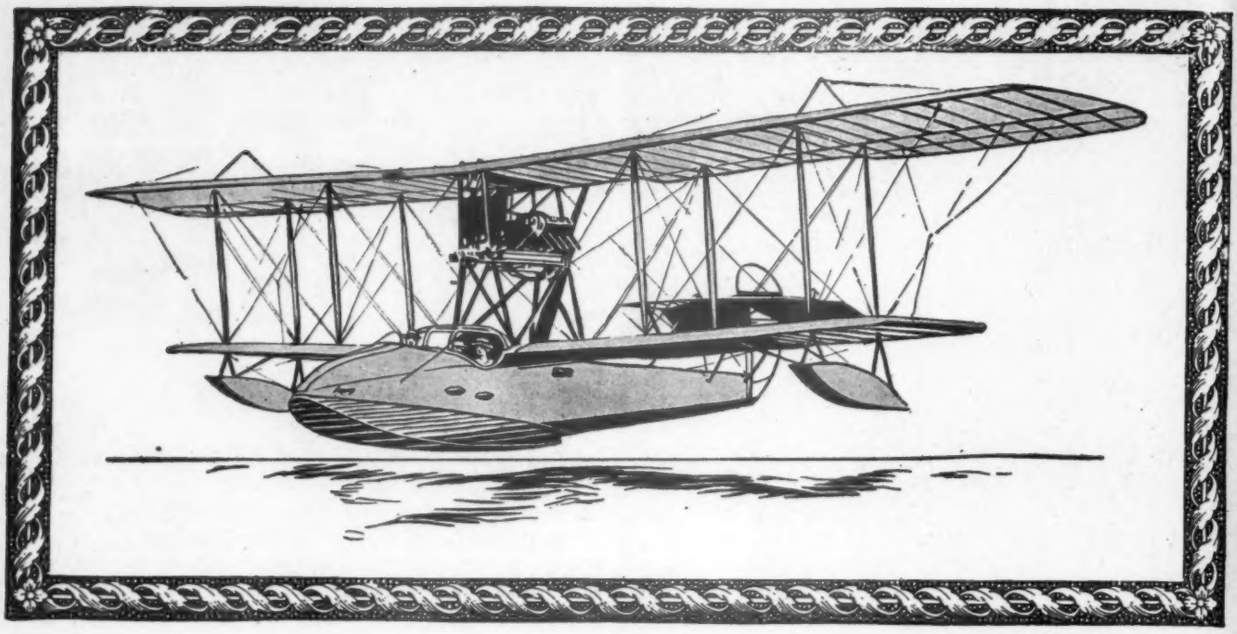

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NOVEMBER 15, 1920 VOL. IX. NO. 9

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INDEX TO CONTENTS

Editorials	283	U. S. Army Air Service	289
Surveying from the Air	284	In the Dayton Wright Airplane Factory	290
The Sperry Messenger Airplane	285	Tests of Aeromarine Model 40 Wing Structure	291
Capt. L. E. Goodier, jr., Returns to Army	286	Notes on Theories of Screw Propulsion	295
A German Diesel Airplane Engine	287	A Variable Surface Airplane	297
The New Handley Page Wing	288	Annual Meeting of Aero Club of America	298
Meteorological Reports Reveal Curious Facts	288	Seattle-Victoria Air Mail in Operation	300

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AVIATION
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AIRCRAFT JOURNAL

Vol. IX NOVEMBER 15, 1920 No. 9

The Army Experimental Station

THAT another year will see McCook Field at some other place than Dayton is inevitable as the lease on the property now occupied expires next summer and there is no probability of its renewal.

The aeronautic industry generally will be glad if the engineering branch of the Air Service can have a location that is more accessible than Dayton. The time and expense of long journeys made frequently is becoming a serious matter and a great relief will be felt if a more convenient site is selected for the new field.

The officers detailed to this most important work of the air service should be nearer the majority of producers of airplanes and also nearer Washington so that closer contact could be had at less inconvenience. A location between New York and Washington which would combine both land and water stations would be a great advantage.

Congress will probably be exceptionally critical of appropriations for next year, but the urgency of the establishment of a permanent engineering station will be so obvious that it will be one of the items that is certain to be allowed.

McCook Field as a flying field for experimental types of airplanes has been absolutely unsuited for this purpose. Its surroundings are so dangerous in the event of forced landings or unsuccessful take-offs that Congress will be unfair to our splendid test pilots if they are not given a field where all kinds of tests can be made with the minimum of danger.

Everyone interested in the future of our Air Service should use every opportunity to acquaint the country with the immediate need of a satisfactory station for aeronautical engineering development.

Interest in Aerodynamic Research

THE designer's interest in aerodynamic research seems to vary year by year. At certain periods of aeronautical progress, he comes to the conclusion that the wind tunnel has given him all the help he needs, that wing sections have attained their maximum efficiency, that stability is but a question of empirical proportions, that the only aerodynamic progress possible is in the last degree of streamline, to attain which his eye is quite as good a guide as any wind-tunnel data. Then, the adoption of an entirely new principle revives his interest to the highest possible degree.

Thus, at the present moment, the introduction of the internally braced monoplane has brought forward a whole series of aerodynamic problems. To begin with it is essential to devise thick wing sections, of sufficient camber to provide ample cantilever strength, with a high lift coefficient to cut down the required area, yet having a reasonable efficiency. Since, with a monoplane the chord is of necessity larger than in a biplane, manoeuverability and stability require that the thick wing have if possible a smaller travel of the center of pressure. This is quite sufficient to require lengthy research, but there are still other problems.

For anything like a large machine, if the wing is to have sufficient strength at the root of the cantilever, there must be either variation in section from root to tip, or variation in plan form and front elevation, with a similar cross section throughout. If the number of possible sections is large, the number of variations on these lines is beyond computation, and it seems very doubtful whether once a section is tapered that its characteristics can be safely deducted from the test of the original untapered section. The few general rules published hitherto are scarcely reliable. There is a very large field to work in, and results to be obtained which every designer will watch with great interest.

Diesel Type Engines for Airplanes

FOR years engineers have been doubtfully inquiring into the possibility of utilizing a Diesel type engine in light automotive practice, but have been deterred from serious consideration of its possibilities by fear of excessive weight and size. It is very interesting to hear therefore that a German engineer has developed a two-stroke, six-cylinder engine, with characteristics somewhat on Diesel lines, fuel being injected into the cylinder where the air pressure is 200 lb. per sq. in, although there is an ignition system which the Diesel system does not have.

The engine is said to be very light and efficient, while the absence of a carburetor and the possibility of using low grade fuel render it very interesting from an automotive point of view.

Engineers will remain doubtful as to the possibility of using such an engine for aircraft, but it certainly offers important advantages as compared with the conventional internal combustion engine.

Sporting Airships

THE Goodyear Pony Blimp when first exhibited created a very favorable impression but doubts were raised as to the possibility of its commercial utilization. It is gratifying to know that equipped with a 60-horsepower Lawrence motor, the pony blimp is doing useful service as a passenger carrier between Los Angeles and Avalon on Catalina Island.

That the small type of sporting airship has a definite field, is also indicated by the fact that one of the best French airship companies, the Zodiac, has recently brought out a very similar machine to the pony blimp. This is a small airship of 1000 cubic meters, provided with a 60-horsepower Gnome et Rhone engine with a well streamlined nacelle with pilot and passenger in an enclosed cabin.

Surveying from the Air

By Col. E. Lester Jones

Director, U. S. Coast and Geodetic Survey

The great possibilities of airplane photography in connection with the water and land work of the Coast and Geodetic Survey and looming up as a potential factor in expediting the mapping of our waterways and interior surveys. This very important subject has been the object of careful study and experiments by officers of the Survey, in collaboration with the other branches of the Government, during the past year and rapid advance in aerial photography, first seriously undertaken during the War, now promises, with proper development, a method of surveying that will probably far exceed expectations over the old methods in rapidity, economy and minuteness of detail.

No little stress should be laid on the fact that, not only are the possibilites good for an early and complete revision of our shore topography, but the opportunities that present themselves for assisting materially in our hydrographic work should not be underestimated.

With the necessary facilities and cooperation supplied by the Army and Navy Aviation Corps to the Coast and Geodetic Survey, experience has already proven the value of aerial photography over the old method of surveying in revision surveys of our coast lines. This work so far, is divided into two branches, *Aerial Photo-Topography,* and *Aerial Photo-Hydrography,* and the results are shown in the following recent practical demonstrations.

Aerial Photo-Topography

In July, 1919, experiments were made at Atlantic City, N. J., to ascertain the adaptability of airplane photographs for use in topographic mapping. The area in the vicinity of Atlantic City was chosen as it is characteristic of so much of the coastal plain territory of the Atlantic Coast. This project was essentially experimental in character, but developed into one of practical value, as the photographs are being used in a revision of the charts of the New Jersey Coast.

This work was done in cooperation with the Air Services of the Army and Navy. Both land and sea planes were used, and in addition several photographs were made from a dirigible. Three types of mapping cameras were tried out, the "L" type, K-L, and Tri-lens. An officer of the Survey kept in close touch with the work and furnished the ground control, constructing special targets in some cases.

A mosaic was constructed by members of the Air Service of the Army, using the photographs made with the K-L mapping camera. These were taken at an altitude of 7,000 feet, using a lens of 10 inch focal length, with a resulting scale of about 1:8,000. A rough control scheme was first laid out, and the mosaic constructed over this.

This mosaic and also the individual photographs have been the subject of study by engineers of the Survey, especially with reference to control and interpretation. Various methods of reduction for chart use were tried out. A study was made of the accuracy of mosaics and individual photographs. The possibilities of control using the photographs themselves to establish a graphic triangulation, have been investigated. The most important point brought out from the study of the results of the work at Atlantic City, was the possibilities in revision work, especially along those sections of the Atlantic Coast where the shoreline is subject to frequent change owing to the action of the sea.

Aerial Photo-Hydrography

At the same time that the experiments at Atlantic City were being made, a distinct line of investigation was being pursued at Key West, Fla. Photographs were made by the Naval Air Service to determine the possible use of aerial photographs in connection with hydrographic surveys. The primary object in view was the elimination of wire drag work, especially in the clear waters of the Florida Coast. An attempt was made to photograph small coral heads and pinnacle rocks, as it is the existence of these needle-like dangers to navigation that require the use of the wire drag. The equipment at the Air Station at Key West was limited, but thorough tests were made with that available. Various types of cameras were used, as well as different combinations of filters and plate emulsions. Photographs were made at altitudes of from 200 feet up to 4000 feet, and under various light conditions. It was hoped that some combination of the various factors involved would produce satisfactory results.

The problem of control was solved, by including in each photograph, two vessels of the Survey. The photographs could not be corrected for tilt with only two known points as a base, but the control as furnished by the positions of the two vessels, was found to be sufficient for experiments.

A well-surveyed area near Key West was chosen, and the vessels proceeded on parallel courses over this area at full speed, the plane flying forth and back above the course. The courses and position of the vessels were recorded as in ordinary sounding work. The photographer in the plane recorded the exact time that each exposure was made, with other data such as altitude, exposure, plate, filter, etc. Each photograph was later orientated by plotting the positions of the vessels on the chart at the instant the exposure was made.

These experiments proved very conclusively that photographs from the air, using present day equipment, are of little practical value to the hydrographer. When any of the underwater features did appear in the photographs, contrast in color was the most prominent with no indication as to whether the contrast indicated shoal or deep water. Varicolored bottom, of uniform depth, appears in the photograph as apparent difference in depth. Many charted shoals are not indicated in the photographs, while adjacent ones show clearly. Taken altogether, the results are so uncertain, that the chances of eliminating field work in hydrography are very remote. Developments in the art of photography may change this viewpoint.

Revision of the Coast of New Jersey

In March, 1920, the Army Air Service photographed the coast line of New Jersey from Cape May to Seabright. A single flight was made using the K-L camera. The plane flew at an altitude of 10,000 feet, and under very good air conditions. The camera was mounted in gimbals, with a load weight at the lowest point to assist in maintaining the optical axis of the camera in a vertical position. Level bubbles were placed on the camera, to aid in keeping the camera in the proper position. This is the most satisfactory way to suspend the camera, and control its verticallity, at the present time. The photographs are being used for a revision of the charts of the Coast of New Jersey. The individual photographs are 13 x 24 cm. in size, and the approximate scale is 1:10,000. The photographs are mounted in strip mosaics, for convenience sake, not over four feet in length. The length is generally determined by the position of control points. This composite photograph is compared with the topographic sheet of the same area, and control points identified. The scale of the photographic mosaic is determined, and by means of the pantograph, the data are reduced to the scale of the chart, and transferred from the photographs to tracing paper.

The photographing of this 120 miles of coast line took less than two hours time in an airplane. The development of the films and printing took two days' time of one man. Two rolls of film were used, a total of 183 photographs. The work of interpreting the photographs, assembling mosaics, comparison with topographic sheet, and reduction to the scale of the chart of the outside shore line, required fifteen days of office work by one engineer.

Schneider Cup Races

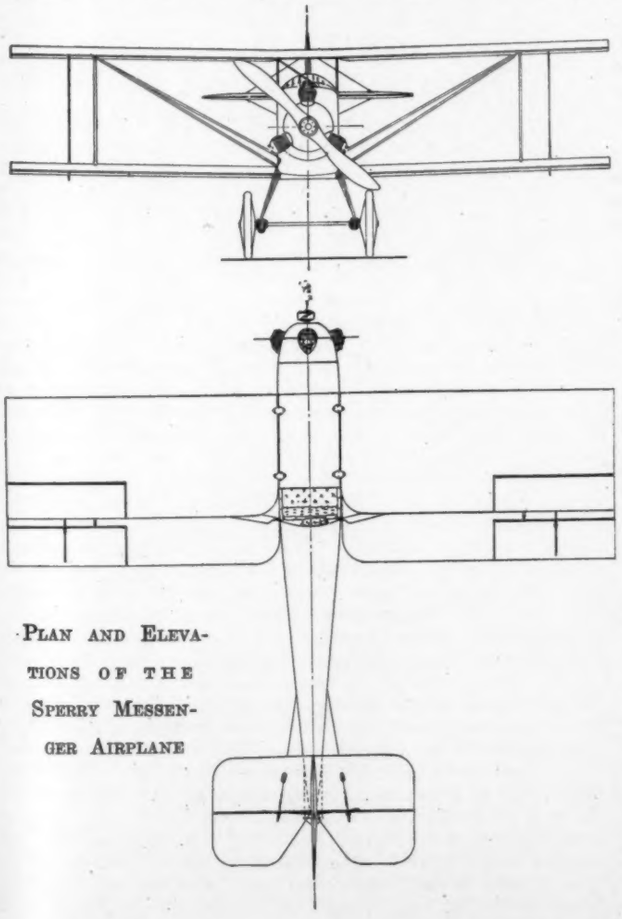
The International Seaplane Race, for the Schneider Cup, held in Venice Sept. 27 was won by the Italian representative, a S.I.A. seaplane of 450 hp. after covering the entire length of 375 km. in 2 hours and 10 minutes in very unfavorable weather.

The Sperry Messenger Airplane

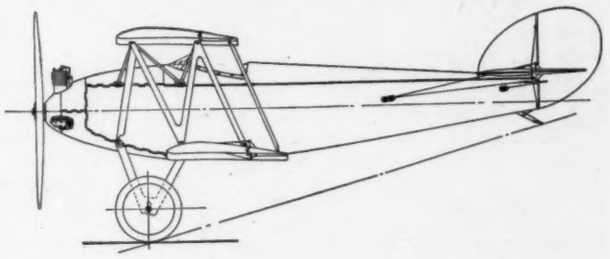
The Messenger plane, as the name implies, was designed by the Engineering Divison of the U. S. Air Service to replace motorcycles for certain messenger duties. It was built by the Lawrence Sperry Aircraft Co., Inc., Farmingdale, Long Island, N. Y. It is a one-place rigid truss biplane of pleasing appearance, which is due to the clean lines of its design. The Lawrence three-cylinder air cooled engine happily blends into the nicely streamlined fuselage of plywood, leaving only the cylinders exposed to the air, while the steel wing truss and struts are arranged to create a minimum head resistance. The wings, ailerons and tail surfaces are easily detachable and many of the parts are interchangeable, as for instance such parts as the upper and lower wings, and ailerons.

THE SPERRY MESSENGER AIRPLANE

Structurally the machine differs slightly from standard practice, which difference is principally in the rigid type of wing trussing, made of round steel tubing and streamlined with balsa wood. The fuselage is of usual longeron and diagonal strut type covered with three ply mahogany veneer.



PLAN AND ELEVATIONS OF THE SPERRY MESSENGER AIRPLANE



The pilot's cockpit is roomy and neatly upholstered and the rear cushion is so arranged that it may be taken out and a parachute pack carried in its place.

A large instrument board with a complete set of instruments including two tachometers, altimeter, compass, oil gauge, clock and engine switch are mounted conveniently in the machine. The deck fairing and wind shield in front of the pilot are so arranged that, while giving a good view, it deflects the air from the pilot's face, making it unnecessary to wear goggles in flying the machine. The controls are of the standard stick and foot bar type.

The wings are of good design and construction and the upper and lower panels are interchangeable. Great pains were taken to design wings which were strong and simple in construction, as well as to facilitate quick assembly on the field. There is but one lift wire; the rest of the flying and landing loads are taken up by the steel struts. After the machine has once been assembled and the proper length found for the struts it can be reassembled in a few minutes.

The wing spars are of channeled spruce. Ribs are built up of mahogany webs, with spruce cap strips. Ailerons are fitted to both upper and lower wings. All four are interchangeable. The wings were sand tested at McCook Field standing a factor of safety of seven without failing. The wings were also tested for inverted flight taking a factor of safety of four without failure.

The power plant as mentioned before is a three-cylinder 60

hp. Lawrence air cooled engine which has given wonderful results on several test runs by the government. The engine ran through the standard 50-hour test without the slightest indication of trouble or wear. The engine is supported by two steel plates on either side, which are supplied by the manufacturer. These plates in turn are bolted to the fuselage nose veneer panel, giving a strong and flexible mounting. The gas tank is built in two compartments, the lower or main tank

THREE-QUARTER REAR VIEW OF THE SPERRY MESSENGER AIRPLANE

contains 6.7 gal., sufficient for one and a half hours of flight. The upper or auxiliary tank contains 3.3 gal., sufficient for a half hour.

The machine went through a number of wind tunnel tests, and the best stabilizer setting was determined, and is such that a very satisfactory longitudinal stability was obtained. The stability of the machine is reported to be good under both high and low speeds. and the difference can hardly be felt on the control stick under these two conditions. The controllability is said to be remarkable on all three controls, and without tendency to act too quickly. In this respect it is comparable to the SE-5, while the maneuverability is comparable to the Nieuport. Due to the low wing loading and the high lift wing it has a slow landing speed which gives the pilot the feeling that he can land almost any place.

It is interesting to note that the performance of this machine, with only 60 hp. and a wing curve which was designed for high lift while sacrificing added resistance at high speed has a better performance than most planes having the same loading per sq. ft. and per hp. This performance is gained chiefly on account of the fact that the motor permits a great saving on the fuselage resistance.

The specifications as supplied by the manufacturer follow:

Specifications of the Messenger

Span	20 ft. 0 in.
Length	17 ft. 9 in.
Height	7 ft. 0 in.
Chord	48 in.
Gap	45 in.
Stagger	18 in.
Wing curve	USA-15
Area of main planes	152 sq. ft.
Area of stabilizer	12.3 sq. ft.
Area of fin	1.8 sq. ft.
Area of rudder	5.3 sq. ft.
Area of elevator	4.7 sq. ft.
Horsepower	60
Weight, empty	581 lb.
Useful load	239 lb.
Weight, loaded	820 lb.
Loading per sq. ft.	5.4 lb.
Loading per hp.	13.5 lb.
High speed	95 m.p.h.
Low speed	35 m.p.h.
Climb in 10 minutes	10,000 ft.

Holland Limits Flying

So many continental airplane lines now cross Holland that some of the cities have adopted ordinances to prevent the air liners from flying so low as to become a source of danger. An ordinance adopted at The Hague requires the air pilots to keep more than 300 feet above the level of the city.

Captain L. E. Goodier, Jr., Returns to Army

Capt. L. E. Goodier, Jr., who for the last year has been an executive of the Gardner, Moffat Co., has been ordered on active duty at the Georgia Institute of Technology as instructor. Capt. Goodier is one of the pioneer army aviators. He was born at Utica, N. Y., on August fifth, 1885, and received his early education in various schools in Utica and Washington. He received the degree of B. S. in Engineering Chemistry from the Georgia Institute of Technology in 1908.

Capt. Goodier entered the army in September, 1908, and was assigned to the Coast Artillery Corps. He transferred into the Aviation Section of the Signal Corps on September 25, 1912. He received his primary flying training at the Curtiss factory at Hammondsport, N. Y., and completed his training at San Diego on December 26, 1912. He holds pilot's license No. 200 and expert pilot's license No. 10. Capt. Goodier was rated a military aviator on February 16, 1913. He started the army flying school on North Island, San Diego, Calif., with Lieuts. Geiger, Brereton, McCleary and Park in December, 1912.

While a passenger with Glenn Martin during a flight on November 5, 1914, he had both legs broken when the airplane fell. He was in the hospital until January 3, 1916. As a result of his injuries, he was retired from active duty on July 1, 1916. He returned to active duty on July 11, 1916, and remained in the army until May 20, 1919. During the war he held the rank of Lieutenant Colonel (temp.) Capt. Goodier started Chandler Field at Essington, Pa., in April, 1917. Later he was commanding officer at Gertsner Field, Lake Charles, La., from November, 1917, to April, 1918. His next duty was in charge of the Operations Section of the Air Service at Washington, D. C., until June, 1918. He was overseas from Sept., 1918, until December, 1918. On his return to this country, he was assigned as Air Service Officer in the Western Department of the Army. He remained on this duty until his retirement in May, 1919.

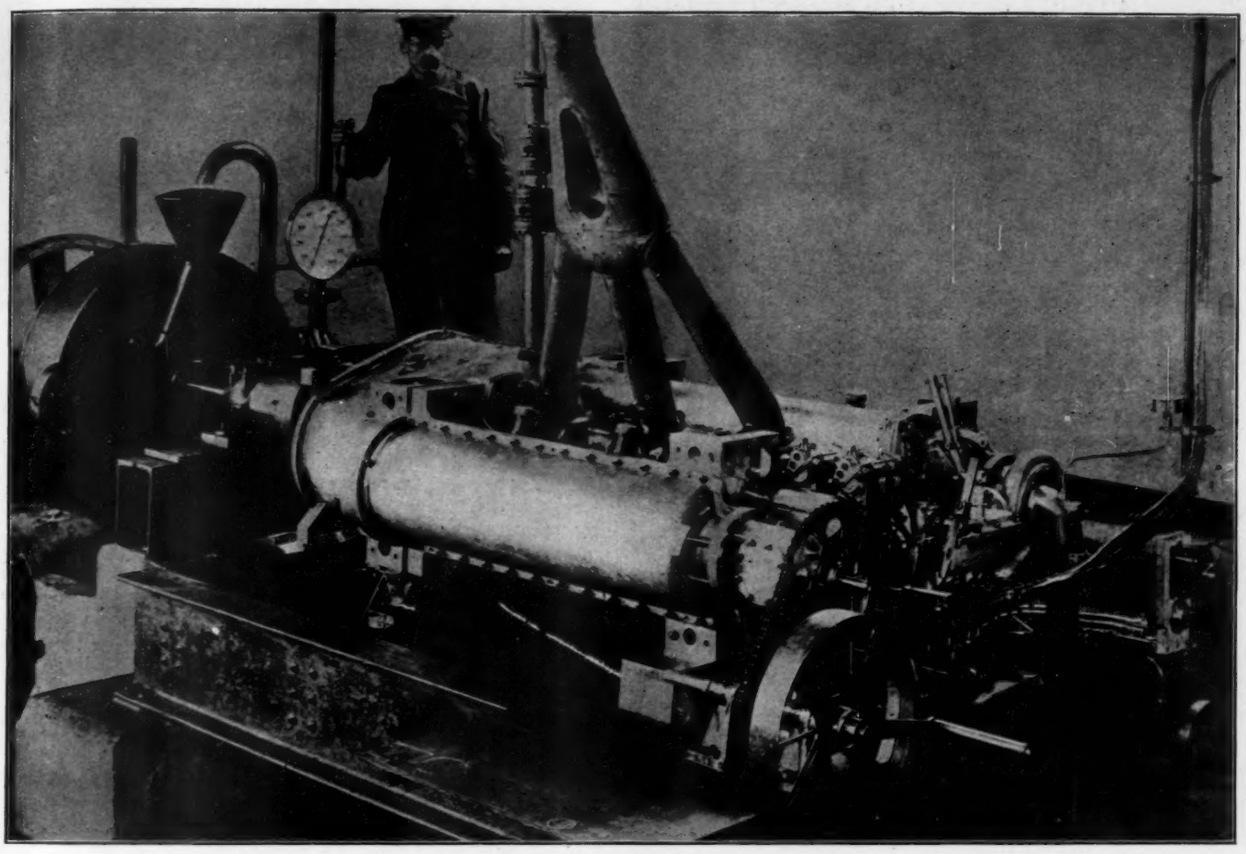
Airplane to Sell Trucks

Truck salesmen have found the airplane the logical equipment for use in calling on the buyers for this product, R. C. Cole explains. His company, which has the agency in five states for the Master Truck and Grant Six automobile, has recently opened a branch house in Oklahoma City.

Cole, who hails from Indianapolis, believes that the sale of Master trucks in this state can be greately increased and he has started some novel but business like methods of stimulating distribution. First he has secured the use of a combination aviator and truck salesman during the State fair. Exhibition flights will be given daily by the salesman who will place his plane on inspection at the salesroom at night. Any prospective customer living in the state that cannot attend the fair will be called upon by the aviator in his spare time. Cole figures that he can reach the farm home of any probable buyer in the state, sell a truck and return within several hours.

A German Diesel Airplane Engine

A new type of airplane engine has appeared which possesses many novel features. It has been developed by Prof. Junkers, the noted German aircraft engineer. It has six cylinders and is noteworthy in the following respects: It operates on the two-cycle principle; it has no carburetor, fuel being ejected directly into the cylinders; it has no valves; there are two opposed pistons per cylinder and two crankshafts connected by gearing at one end. All these features are quite new to small engine practice although they have been used for 15 years or more in the design of certain large stationary and marine engines.



Diesel Aircraft Engine on Test Stand

The advantages claimed for the new engine are: Greater fuel economy; increased simplicity; elimination of vibration; fire safety; and light weight.

The functioning of the engine is easy to understand. The pistons move in together and move out together. As the pistons move out they uncover the intake and exhaust ports. The intake ports are exposed by the right piston and the exhaust ports by the left. The exhaust ports are larger and are therefore exposed first. This permits the major portion of the exhaust gases to escape before the intake ports are uncovered.

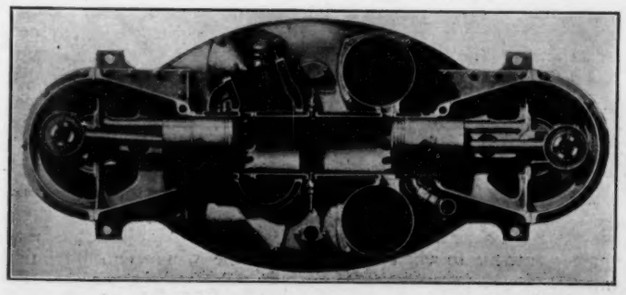
When the intake ports are opened pure air surges in, impelled by a blower located at one end of the crankcase. This air forces any remaining exhaust gas out of the chamber so that by the time the pistons shut off the ports on their return strokes, the chamber is full of fresh air. As the pistons move in they compress this air but before inner dead center is reached a measured quantity of gasoline is injected into the space through the nozzle located just under the spark plug. Since the compression is very high, more than 200 pounds, as compared with less than 100 in the ordinary engine, the air is very hot so that the liquid fuel vaporizes instantly. A moment later a spark occurs to ignite the charge.

Greater fuel economy is an important consideration in aircraft since the non-stop ability of the machine is limited to its available fuel carrying capacity. The economy of the Diesel engine is due to the fact that the principle on which it operates is essentially more economical than that employed in the ordinary engine common to both aircraft and automobiles. Vibration is minimized since the forces generated by opposing pistons cancel each other.

The engine is peculiarly fire safe since fuel is delivered directly to the engine cylinders; there is no dangerous mixture of air and gasoline outside of the engine; and not the same danger from fuel leaks that obtains in the ordinary engine.

The low weight is due to the fact that there is a power stroke in every cylinder every revolution, or twice as many as in the four-cycle.

This engine offers interesting possibilities for automobiles and motor trucks particularly since it can use low grade fuel;



Section Through the Diesel Aircraft Engine

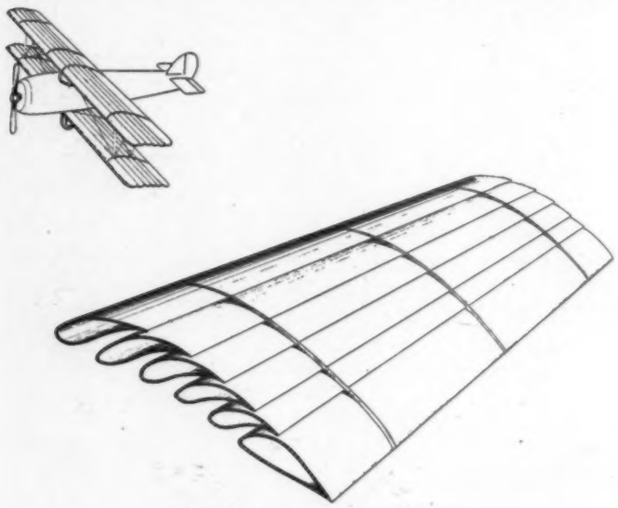
in fact the true Diesels run on crude oil. The aircraft engine developed by Prof. Junkers differs from the big Diesels in that it possesses an ignition system. In the big engines the air is compressed to 600 or 700 lb. or more which renders it so excessively hot that the fuel takes fire the instant it is injected but with an aircraft engine such extreme pressures are out of the question, although the compression pressure used is more than twice that employed in the usual engine.

The heating effect is not great enough to cause ignition of the fuel, therefore magnetos and spark plugs are fitted. The engine as it stands is hardly suitable for automobiles or motor trucks for the reason that its construction is too expensive and it cannot be throttled as well as the ordinary types but it may be possible to overcome these difficulties. The same criticisms naturally apply to the possibility of its use in the airplane.

The New Handley Page Wing

This is a statement regarding the Handley Page wing received from the Handley Page Co. and printed textually. It is not possible to say at the moment what are the quantitative results obtained with this wing.—ED.

The design of aircraft has, from the very commencement, been associated with the problem of safety in rising from and alighting on the ground. Anything which tends to promote slow speed, and therefore safety in landing, is necessarily to



THE HANDLEY PAGE WING

the good of aviation. Technically, too, the high speed which an airplane can reach in the air is indirectly connected with the landing speed.

The special feature of the new Handley Page wing is, that by its use, landing speeds far slower than those obtained up to the present will be possible, or, conversely, greater loads can be carried or higher speeds obtained with the same horsepower.

Another special feature of the Handley Page wing is that it has very much greater lift for every square foot of its surface compared with an ordinary wing and this is accomplished by means of a most simple wing construction, which at first sight would seem to reduce rather than increase the lift of the wing. The construction consists in having slots right through the plane, connecting the lower and the upper surfaces, and to the uninitiated it would appear that these slots, allowing the air to escape from the under to the upper surface of the wing, took away all the lift. Strange as it may seem, the reverse is exactly the case. The slots in the wing virtually convert a single wing into a number of wings, and increase the lifting power of the wing two or three times as much as in the ordinary construction.

Supposing, for instance, that a machine today lifts a total weight of a ton and a half and has a wing area of 400 sq. ft. With the new construction it will be possible to lift the same weight with a wing area of only 200 to 300 sq. ft. In consequence, owing to their smaller size, the wings can be built much more stoutly without increasing the weight, and so all-metal wings become much more possible commercially.

Beyond this is the further and most important feature. With the high-lifting capacity of these wings it is possible to fly more efficiently at full speed. These new wings at full speed are inclined at larger and more efficient angles than heretofore, so that the lift is obtained with much less horsepower to drive the machines through the air. Up to the present it has not been possible to design machines heavily loaded and efficient such as this, because it would have meant the commercially impossible landing speeds of 70 to 80 miles an hour. Now, however, with this new construction, landing speeds smaller even than those now usual have been obtained with all the advantages described above.

It is from a fundamental advance such as this that progress in aircraft will be made. First comes the improvement in basic principle, next the adaptation to engineering design and lastly operation in service at a decreased cost and with increased reliability to the public. Time must elapse before the public will benefit from these advantages. Minor improvements may be necessary for their full advantage to be gained but there is no doubt that it is on advances such as these that the whole future of aircraft development depends.

In viewing today the airplane fitted with an early type of this slot it is possible to see the beginning of the practical accomplishment in flying of what laboratory tests have shown can be finally accomplished.

Meteorological Reports Reveal Curious Facts

Pilots at March Field, Riverside, Cal., are taking considerable interest in the meteorological reports compiled and posted twice daily in the school building, says *The Fly Leaf*. The meteorology station installed and operated by Signal Corps personnel is revealing many interesting facts that heretofore have somewhat mystified close observers of climatic and atmospheric conditions about March Field.

Often pilots have reported that it required more actual flying time to reach Rockwell Field, San Diego, than it did to return from that base to this school. They could not understand this when the popular opinion prevailed that when flying south they always had a wind on their tail. Ground observations would bear out this belief but reports posted by the meteorological experts indicate that at various altitudes the wind direction is changed.

Readings are taken twice daily from a small captive balloon and instruments which record altitude, direction, velocity, temperature and relative humidity. Corp. James H. Kearns prepared and the following wind-aloft report Thursday, Oct. 7. The first readings were taken at 8 a. m., and those following at 1:30 p. m. Observe closely the variations at various altitudes:

A.M. Report			P.M. Report		
Altitude (feet)	Direction (from)	Velocity (m.p.h.)	Altitude (feet)	Direction (from)	Velocity (m.p.h.)
Surface	E.	0	Surface	N.W.	7
100	E.	0	100	N.W.	7
250	S.E.	0	250	N.	5
500	S.E.	1	500	W.S.W.	4
1000	S.S.E.	2	1000	S.W.	—
1500	S.	2	1500	S.W.	3
2000	S.	2	2000	S.W.	2
2500	S.	2	2500	S.S.W.	4
3000	S.W.	7	3000	S.	8
4000	W.S.W.	—	4000	S.W.	12
5000	W.S.W.	23	5000	S.W.	21
6000	S.W.	36	6000	S.W.	26
7000	S.W.	36	7000	S.W.	37
8000	S.W.	38	8000	S.W.	36
10000	S.W.	38	10000	S.W.	29
12000	S.W.	36	12000	W.S.W.	28
Temperature 49 F. Relative humidity, 93 per ct.			Temperature, 82 F. Relative humidity, 62 per ct.		

Mexican Officials Given Flights

Recently an official visit was made to Fort Bliss by several Custom and Consular officials of Juarez. At the Post Commanders request, four of the visitors were taken up for fligts lasting forty-five minutes. General Fox, commanding the Juarez garrison, was proud to hold the altitude record for the visitors, reaching an altitude of 5,000 feet, and all expressed themselves as having had a most enjoyable flight.

U. S. Army Air Service

CHIEF OF AIR SERVICE

With rank of Major General

Menoher, Charles T.....July 1, 1920

ASSISTANT TO THE CHIEF OF AIR SERVICE

With rank of Brigadier General

Mitchell, William.....July 1, 1920

Colonels

Hall, Cholmers G.....July 1, 1920
Mitchell, William.....July 1, 1920

Lieutenant Colonels

Chandler, Charles De F.....May 15, 1917
Fechet, James E.....July 1, 1920
Culver, Clarence C.....July 1, 1920
Fravel, Ira F.....July 1, 1920
Baldwin, Theodore A., jr. (Inf.) (August 9, 1920) July 1, 1920
Beck, Paul W. (Inf.) (August 9, 1920) .....July 1, 1920
Vanway, Charles W. (Cav.) (August 24, 1920) ..July 1, 1920
Danforth, Charles H. (Inf.) (August 9, 1920)...July 1, 1920
Miller, Archie (Cav.) (August 24, 1920).....July 1, 1920
Perkins, Alvin S. (Cav.) (August 24, 1920).....July 1, 1920
Fuller, Arthur L. (C. A. C.) (July 22, 1920).....July 1, 1920

Army Area Air Service Officers

First Army Area

First Corps Area—Includes the North Atlantic Coast Artillery District and the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island; headquarters, 99 Chauncy st., Boston, Mass.

Commander, Maj. Gen. David C. Shanks.

Air Service officer, Maj. Leonard H. Drennan.

Second Corps Area.—Includes the States of New York, New Jersey, and Delaware; headquarters, Governors Island, New York. The Island of Porto Rico, with the islands and keys adjacent thereto, is, for administrative purposes, attached to the Second Corps Area.

Commander, Maj. Gen. Robert L. Bullard.

Air Service officer, Maj. Henry L. Watson.

Third Corps Area.—Includes the States of Pennslyvania, Maryland, Virginia, and the District of Columbia; headquarters, Ft. McHenry, Md. (temporarily at Baltimore, Md.)

Commander, Maj. Gen. Adelbert Cronkhite.

Air Service Officer, Maj. Albert L. Sneed.

Second Army Area

Fourth Corps Area.—Includes the States of North Carolina, South Carolina, Georgia, Florida, Alabama, Tennessee, Mississipi, Arkansas, and Louisiana; headquarters, Ft. McPherson, Ga. (temporarily at Charleston, S. C.).

Commander, Maj. Gen. John F. Morrison.

Air Service officer, Maj. Henry B. Clagett.

Fifth Corps Area.—Includes the States of Ohio, West Virginia, Indiana and Kentucky; headquarters, Ft. Benjamin Harrison, Indiana.

Commander, Maj. Gen. George W. Read.

Air Service Officer, Maj. Ira Longanecker.

Sixth Corps Area.—Includes the States of Illinois, Michigan, and Wisconsin; headquarters, Ft. Sheridan, Ill. (temporarily at Chicago, Ill.).

Commander Maj. Gen. Leonard Wood.

Air Service officer, Maj. William C. McChord.

Third Army Area

Seventh Corps Area.—Includes the States of Missouri, Kansas, Iowa, Nebraska, Minnesota, North Dakota and South Dakota; headquarters, Fort Crook, Nebr.

Commander, Maj. Gen. Omar Bundy.

Air Service officer, Capt. Ira A. Rader.

Eighth Corps Area.—Includes the States of Texas, Oklahoma, Colorado, New Mexico and Arizona; headquarters Ft. Sam Houston, San Antonio, Tex. (For the purposes of administrative and tactical control in connection with the Border Patrol and field operations incident thereto, such part of the State of Arizona as lies west of the 114 deg. meridian and south of the 33 deg. parallel is attached to the Ninth Corps area.)

Commander, Maj. Gen. Joseph T. Dickman.

Air Service officer, Maj. Henry C. Pratt.

Ninth Corps Area.—Includes the North Pacific Coast Artillery District, the South Pacific Coast Artillery District; the States of Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada and California; headquarters, Presidio of San Francisco, Cal. (temporarily at San Francisco, Cal..) The Territory of Alaska is attached to the Ninth Corps Area for administrative purposes. (For the purpose of administrative and tactical control in connection with the Border Patrol and field operations incident thereto such part of the State of Arizona as lies west of the 114 deg. meridian and south of the 33 deg. parallel is attached to the Ninth Corps Area.)

Commander, Maj. Gen. Hunter Liggett.

Air Service officer, Capt. Henry H. Arnold.

The Hawaiian Department.—Includes the Hawaiian Islands and their dependencies; headquarters, Honolulu, Hawaii.

Commander, Maj. Gen. Charles G. Morton.

Air Service officer, Maj. John F. Curry.

The Philippine Department.—Includes all of the Philippine Archipelago and troops in China; headquarters, Manila, P. I.

Commander, Maj. Gen. Francis J. Kernan.

The Panama Canal Department.—Includes the entire Canal Zone; headquarters, Quarry Heights, Balboa Heights, Canal Zone.

Commander, Brig. Gen. Chase W. Kennedy.

Air Service officer, Capt. Millard F. Harman, jr.

Location of Air Service Units

Wings

1st (Headquarters) .....Kelly Field, Tex.
2d (Headquarters) .....Langley Field, Hampton, Va.

Groups

1st Day Bombardment Group: Headquarters, Kelly Field, Tex. Troops: 11th, 20th, 96th and 166th Day Bombardment Squadrons and 258th Heavy Bombardment Squadron.

1st Pursuit Group: Headquarters, Kelly Field, Tex. Troops: 27th, 94th, 95th, and 147th Pursuit Squadrons.

1st Observation Group: Headquarters, Manila, P. I. Troops: 2d and 3d Observation Squadrons.

1st Surveillance Group: Headquarters, camp at Fort Bliss, Tex. Troops: 8th, 90th, and 104th Surveillance Squadrons.

1st Army Observation Group: Headquarters, Langley Field, Hampton, Va. Troops: 1st and 12th Army Observation Squadrons.

2d Observation Group: Headquarters, Honolulu, Hawaii. Troops: 4th and 6th Observation Squadrons.

3d Observation Group: Headquarters, France Field, Canal Zone. Troops: 5th (not yet joined) and 7th Observation Squadron.

Aero Squadrons

1st Army Observation .....Mitchel Field, Garden City, N. Y.
2d Observation .....Fort Mills, P. I.
3d Observation .....Camp Stotsenburg, P. I.
4th Observation .....Luke Field, Fords Island, Hawaii
Flight A .....Schofield Barracks, Hawaii
5th Observation .....Mitchel Field, Mineola, N. Y.
6th Observation .....Luke Field, Fords Island, Hawaii
7th Observation .....France Field, C. Z.
8th Surveillance .....McAllen, Tex.
Flight B .....D. S., Cp. Bragg, N. C.

9th Corps Observation .....Mather Field, Calif.
Flight A .....D. S. Fresno, Calif.
Flight B .....D. S. Red Bluff, Calif.
10th Corps Observation .....Bolling Field, Anacosta, D. C.
11th Day Bombardment .....Kelly Field, San Antonio, Tex.
12th Army Observation .....Nogales, Ariz.
Flight A .....Douglas, Ariz.
20th Day Bombardment .....Kelly Field, San Antonio, Tex.
27th Pursuit .....Kelly Field, San Antonio, Tex.
50th Observation .....Langley Field, Hampton, Va.
Flight A .....Fort Screvens, Ga.
Flight B .....Langley Field, Hampton, Va.
88th Observation .....Langley Field, Hampton, Va.
90th Surveillance .....Sanderson, Tex.
Flight A .....Del Rio, Tex.
91st Corps Observation .....Rockwell Field, Calif.
Flight A .....Puryear Field, El Centro, Calif.
94th Pursuit .....Kelly Field, San Antonio, Tex.
95th Pursuit .....Kelly Field, San Antonio, Tex.
96th Day Bombardment .....Kelly Field, San Antonio, Tex.
99th Corps Observation .....Bolling Field, Anacostia, D. C.
104th Surveillance .....Camp at Fort Bliss, Tex.
Flight B .....Post Field, Fort Sill, Okla.
135th Observation .....Post Field, Fort Sill, Okla.
Flight A .....D. S. Fort Leavenworth, Kans.
147th Pursuit .....Kelly Field, San Antonio, Tex.
166th Day Bombardment .....Kelly Field, San Antonio, Tex.
258th Heavy Bombardment ...Aberdeen Proving Ground, Md.
614th Construction .....Camp Travis, Tex.

Air Park Companies

2d .....Kelly Field, San Antonio, Tex.
5th .....Kelly Field, San Antonio, Tex.

Airship Companies

No. 8 .....Camp Owen Bierne, Fort Bliss, Tex.
No. 10 .....Langley Field, Hampton, Va.
No. 16 .....Brooks Field, San Antonio, Tex.
No. 19 .....Langley Field, Hampton, Va.

Balloon Companies

No. 1 .....Ross Field, Arcadia, Calif.
No. 2 .....Ross Field, Arcadia, Calif.
No. 3 .....Fort Ruger, H. T.
No. 4 .....Fort Leavenworth, Kans.
No. 5 .....Brooks Field, San Antonio, Tex.
No. 6 .....Brooks Field, San Antonio, Tex.
No. 7 .....Brooks Field, San Antonio, Tex.
No. 9 .....Fort Omaha, Nebr.
No. 11 .....Brooks Field, San Antonio, Tex.
No. 12 .....Fort Omaha, Nebr.
No. 13 .....Ross Field, Arcadia, Calif.
No. 14 .....Fort Winfield Scott, Calif.
No. 15 .....Ross Field, Arcadia, Calif.
No. 17 .....Manila, P. I.
No. 18 .....Aberdeen Proving Ground, Md.
No. 20 .....Lee Hall, Va.
No. 21 .....Fort Kamehameha, H. T.
No. 22 .....D. S. Princetown, Mass.
No. 23 .....Post Field, Fort Sill, Okla.
No. 24 .....Fort Winfield Scott, Calif.
No. 25 .....Ross Field, Arcadia, Calif.
No. 26 .....D. S. Princetown, Mass.
No. 27 .....Manila, P. I.
No. 28 .....Lee Hall, Va.
No. 29 .....Lee Hall, Va.
No. 30 .....Lee Hall, Va.
No. 31 .....Goodman Field, West Point, Ky.
No. 32 .....Camp Benning, Ga.

Photo Sections

No. 1 .....Camp at Fort Bliss, Tex.
No. 2 .....Kelly Field, San Antonio, Tex.
No. 4 .....D. S., Camp Knox, Ky.
No. 6 .....Manila, P. I.
No. 7 .....Langley Field, Hampton, Va.
No. 11 .....Honolulu, Hawaii
No. 12 .....France Field, Canal Zone
No. 14 .....Mitchel Field, L. I.
No. 15 .....Crissy Field, San Francisco, Calif.

Army Service Corps

Provisional Guard Company No. 3 ....Germany, A. P. O. 927
Provisional Guard Company No. 9 ...Germany, A. P. O. 927
Provisional Guard Company No. 12...Germany, A. P. O. 927
Provisional Guard Company No. 13...Germany, A. P. O. 927

In the Dayton Wright Airplane Factory

D.H. Airplanes with 300 Hp. Hispano-Suiza Engines in Assembly Department of the Dayton Wright Co. Factory

Test of Aeromarine Model 40 Wing Structure

The Model 40 Flying Boat, which was sand tested, was manufactured by the Aeromarine Plane and Motor Co. of Keyport, N. J. The machine is a two place, pusher type, flying boat, equipped with a Curtiss OXX-6, 100 hp. engine, designed for training purposes.

The ailerons are on the upper wings only and are connected by a cable running along the top of the upper wing. The ailerons extend about six inches beyond the trailing edge of the wing.

Summary of Weights

Hull	592.0 lb.
Engine section	650.0 lb.
Wings	542.0 lb.
Tail unit	87.0 lb.
Crew	360.0 lb.
Wing floats	62.0 lb.
Gasoline, 20 gal.	119.5 lb.
Oil, 2.75 gal.	19.0 lb.
Water	36.0 lb.
Total weight, full load	2467.5 lb.

Both wings are in two sections, the top attached by hinge-fittings to the engine section panel and the lower to fittings on the wing section of the hull.

The spars are of I section spruce or Port Orford cedar of the finest quality of two laminations, bonded with cassein glue. The upper front and rear spars are spliced in two places, in accordance with specifications. The spars are left solid at both the internal and external strut attaching points and also wherever any bolts are attached, such as the wing and aileron hinges and fittings for the wing float braces. The ribs are made of white pine, reinforced with fiber strips between lightening holes, and spruce cap strips.

The ply veneer forms the nose or entering edge of the upper surface of both wings. False ribs are placed between the standard ribs from the spruce entering edge to the front spar. The internal wing struts are of square cross section, tapering to a round section at each end. Double wiring takes all drift stresses while single winding is used for truing up.

The trailing edge is spruce and the outer edges are seven-ply spruce, curved to take the tensional pull of the cloth caused upon application of dope.

The lower wing is provided with band holes on the outer ends and sidewalks alongside the hull.

Both the wings are connected by two pairs of interplane struts on each side of the body. These are made of three laminations of first class spruce or Port Orford cedar, machined to a streamline cross section on a Mattison strut machine.

The lift wires are all doubled and 3/16 in. and 5/32 in. stranded cable is used. The landing wires are single 3/16 in. stranded cable; the nose wires are 5/32 in. cable and the stagger wires 1/8 in. cable.

A triangular cabane is provided on the upper wing, made of steel tubing with four wires running to the wings to take the landing stresses of the overhand. The wing section is R.A.F.-6.

Load Computations

The loading for the sand test of the Model 40 wing structure was computed from data given in Aircraft Technical Note No. 107. An example of the methods used in computing the loading and the weight of each bag is given on the following pages:

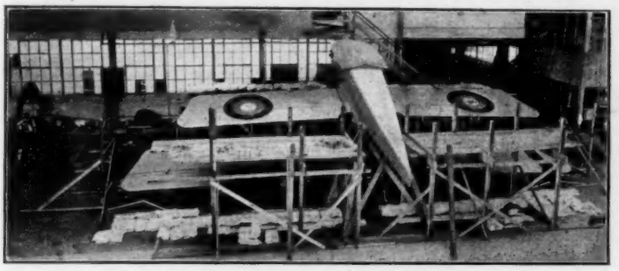
1. Weights.
   Total weight of machine, full load ..... 2467 lb.
   Total weight of wing structure, including ailerons but not wing tip floats and braces nor engine panel ..... 542 lb.
2. The net lift is equal to the total weight of the machine minus the weight of the wing structure.

The loading of the upper and lower wings is obtained from the following:

$$W = \frac{11}{9} A_u x + A_l x$$

W = Net lift
A_u = Area of upper wing.
A_l = Area of lower wing.
x = Loading per sq. ft. of lower wing.

3. The first load applied to the wings designated "first unit load," is equal to the net lift minus the weight of the wing structure since the zero reading wings are jacked up and do not support even their own weight. The method used in



General View of Set-Up

computing the amount of load in each section and the load for each bag is the same as used for a "full unit load."

Net lift = 1925 lb.
Weight of wings = 542 lb.
"First unit load" = 1383 lb.

$$1383 = \frac{11}{9} 291x + 200x$$
$$1383 = 355.5x + 200x$$
$$= 553.5x$$
$$x = \frac{1383}{555.5}$$
$$x = 2.49 \text{ lb./sq. ft. on lower wing.}$$
$$\frac{11x}{9} = 3.04 \text{ lb./sq. ft. on upper wing.}$$

291 × 3.04 = 885 lb.
200 × 2.49 = 498 lb.
Total = 1383 lb.

A "full unit load" is equal to the net lift. This is considered the actual load on the wing structure while in flight. The computations given are complete and show how all loading was computed.

$$\text{Net lift} = 1925 = \frac{11x}{9} + A_l x$$
$$= \frac{11x}{9} 291x + 200x$$
$$= 355.5x + 200x$$
$$= 555.5x$$
$$= \frac{1925}{555.5}$$
$$x = 3.46 \text{ lb./sq. ft., loading of lower wing.}$$
$$\frac{11x}{9} = 4.24 \text{ lb./sq. ft., loading of upper wing.}$$

291 × 4.24 = 1233 lb.
200 × 3.46 = 695 lb.
1925 lb.

Distribution of Load

Eight-tenths of the load was applied on the forward six-tenths of the chord.

Two tenths of the load was applied on the rear four-tenths of the chord. The following size bags were used:

"A" bag, 22.5 in. × 11.25 in., Area 1.76 sq. ft.
"B" bag, 22.5 in. × 12 in., Area 1.875 sq. ft.

"C" bag, 24. in. × 7.5 in., Area 1.25 sq. ft.
Load, upper wing forward 0.6 of chord.

$$\frac{1233 \times 0.8}{0.6 \times 291} = \frac{986.4}{174.6} = 5.64 \text{ lb./sq. ft.}$$

Loading bag "A", 5.64 × 1.76 = 9.92 lb.
Loading bag "C", 5.64 × 1.25 = 7.04 lb.
Load, upper wing rear 0.4 of chord.

$$\frac{1233 \times 0.2}{0.4 \times 291} = \frac{246.6}{116.4} = 2.11 \text{ lb./sq. ft.}$$

Loading bag "A", 2.11 × 1.675 = 3.95 lb.
Loading bag "C", 2.11 × 1.25 = 2.64 lb.
Load, lower wing forward 0.6 of chord.

$$\frac{692 \times 0.8}{0.6 \times 200} = \frac{553.6}{120} = 4.62 \text{ lb./sq. ft.}$$

Loading bag "A", 4.62 × 1.76 = 8.14 lb.
Load, lower wing rear 0.4 of chord.

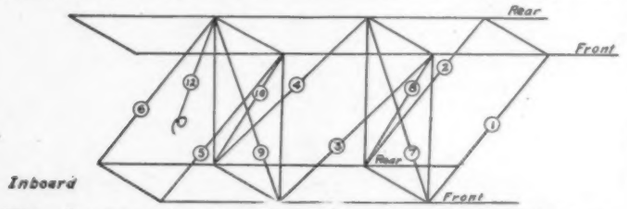
$$\frac{692 \times 0.2}{0.4 \times 200} = \frac{138.4}{80} = 1.73 \text{ lb./sq. ft.}$$

Loading Bag "B" = 1.73 × 1.875 = 3.24 lb.
Loading Bag "C" = 1.73 × 1.25 = 2.18 lb.

Bags loaded half the weight of those used for "full unit loads" were used for "half unit loads."

Preparations for Test

The sand bags used were made of eight and ten ounce duck, cut to size and sewed on a machine. Each bag was



WIRE DIAGRAM SHOWING PORT WING STRUCTURE. STARBOARD WIRES ARE NUMBERED EXACTLY THE SAME

divided into four pockets in order that the loading would be evenly distributed. When sewing the bags, one side was left open so that bags could be loaded.

The loading of the bags was based on the number of square feet covered by each bag. Three sizes of bags were used for the test. Each pocket of the bag was carefully filled with dried sand and the total weight of the bag was checked to within one ounce.

The arrangement of the bags for the test was done in a systematic manner. Before laying out the bags were kept in piles, each pile containing a definite number of bags of one weight. A chart was made up giving the number of bags of various weights and sizes used for each load. From this data the loads were laid out in order, near the section to which they were to be applied.

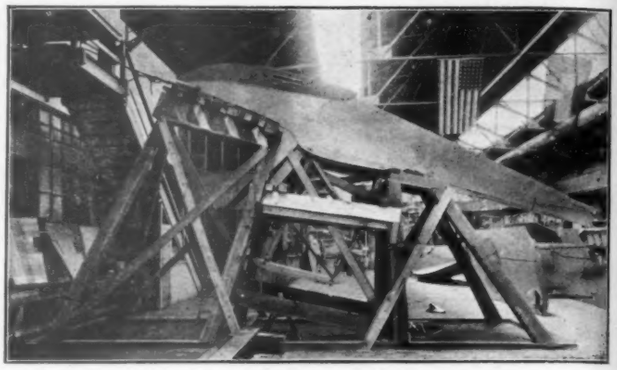
The bags for loading of the lower wing were arranged on the rear part of the staging provided for the loading of the wings.

The loads were laid out in layers, each load being separated by long strips of wood. This method of separating the loads was used to make certain that only the required number of bags were taken for one load. Chalk marks on floor and wing separated each loader's area of operation and gave him a starting point to pick up bags and to lay them on the wing.

Jacks were used to support the wings while the loads were being applied and released while deflections were being taken. The number of jacks used was sixteen, these being placed directly under the strut points, overhand wire fittings and at the extreme inner points of the panels. There was no trouble experienced in using the jacks.

The staging supporting the hull was made sufficiently strong so that no failure nor deflection would occur in this part. The staging was arranged to support the hull in such a manner that all stress would be carried by the wing structure and the wing hinge fittings to the hull.

Suitable staging was erected for the loading of the lower panels. This staging being made of sufficient width to allow the lower wing loads to be laid out on the rear part. This staging was substantially built and joined together and no trouble in this respect was experienced during the test. Cross bracing was so arranged to hold the wing structure from collapsing in event of sudden failure occurring.



HULL STAGING

The test was conducted by Fred Keller, who represented the Engineering Department of the Aeromarine Plane and Motor Co. All work done in preparing for and conducting the test was entirely in his charge. Ensign Edmund A. Whiting, U.S.N.R.F., represented Lieut. Alfred Bledsoe, Inspector of Naval Aircraft, U.S.N., and checked all computations and inspected and approved all work done.

Two foremen, four recorders, and twenty-eight men were used in making the test. The duties of each are as follows:

Foremen: Having charge of loading of one-half of machine, comprising one upper and lower panel; to see that all jacks were set up before load was applied; to supervise loading so that proper loads were placed in their proper places; to supervise lowering of jacks so load would be applied evenly.

Recorder: Inspect jacks to see that loads was properly released; read and record deflections for his particular section and report any signs of failure.

Loader: To set up jacks to take load; load wings with required number of sand bags; release jacks after each load, in order that readings may be taken.

Signals: All operations were conducted simultaneously by both sides in accordance with signals from a whistle operated by the engineer in charge of the test. According to a prearranged system, signals were given to set up jacks, start loading, release jacks and take deflection readings. A signal was also given when failure occurred for the men to stand clear of the wings to avert accident. All instructions were given directly to the foremen, who in turn supervised the work of their men. The method of laying out the loads made it possible for the test to be completed in a short time.

Procedure during Test

1. The wings were jacked up just enough to remove the weight from the wires and members.
2. Initial readings were taken on all scales by the recorders. Initial tension was read in all structure wires by means of "tension meters."
3. The "first unit load" was applied. This load is equal to the net lift minus the weight of the wing structure.
4. All jacks were released. Deflection readings on the spars and struts and tension readings on all wires were taken.
5. Wings were jacked up just enough to catch but not raise the wings.
6. "Second unit load" was applied. This load is equal to the net lift on the wings.
7. Jacks were released, deflection readings on spars and struts and tension readings on wires were taken.
8. Wings were jacked up as in paragraph five above.

All subsequent loads were applied in loads equal to full unit load in the same manner and the same operations were repeated with each loading. The loading was continued until five unit loads had been applied. Five unit loads is equal to

83.3 per cent of the load required for a factor of safety of six. At this point, the sand bags were removed from the wings and after a period of one hour the "first unit load" was again applied and the difference between this reading and the first taken for the first load was taken as the permanent set, because the zero reading was taken with the wings jacked up so that they were not carrying their own weight.

The loading was continued by the addition of a load equal to four unit loads. Due to heavier loading on forward part of wing two bags had to be used for this while only one was used on the rear 0.2 of wing. At this point the loading equals a factor of five or 83.3 per cent of the required load. The loading was continued by addition of half unit loads until six unit loads had been applied. This is the total load required by specifications for a factor of safety of six since gross weight of machine is under five tons. The seventh and eighth unit loads were applied in full unit loads and about one minute after the jacks for the eighth load had been released, the upper rear spar on the right side failed in the inner bay.

The following method of taking readings was used: Linear graduated scales were secured to the under surface of the wings in a vertical position at strut points, points of attachment of overhand wires, midway between these points, and at the extreme tips of the wings. Fixed light wires, tightly drawn in a horizontal direction were led past the edges of the scales. The deflections were determined by reading the movement of the scales relative to the wires. Deflections were read to eights of an inch. Means were provided for taking deflections on all struts.

Stresses in all structure wires were taken through the fourth load on lift and stagger wires and through the seventh load on the nose wires by means of tension meters. These instruments were calibrated on an Olsen testing machine before using and checked again on wires similar to those in the wing structure, after the test was finished. The rear outside strut No. 2 on the right side showed considerable deflection. After failure of wing spar this strut returned to zero deflection. A compression test was made on this member after removal from the machine.

Readings were taken on all struts by means of cords held taut during deflections by elastic bands at each end. A scale was attached to the center of the strut and the deflections determined by noting the movement of the scales past the cord. The scales were attached on the leading edge of the rear struts and the trailing edge of the front struts.

It will be noticed that the tension in the wires No. 3 and No. 4, middle bay was about twice that of the overhang wires and that tension in wire No. 6 was about the same as that in wires No. 3 and No. 4. It is particularly interesting to note that wire No. 5, inner bay, forward assumed two-thirds more load than wire No. 6, although tension in wires No. 3 and No. 4 was nearly the same. No doubt this is due to the nose drift wire No. 12 leading to the No. 6 wire terminal and carrying part of its load. On the other hand the stress analysis shows this condition.

WIRE STRESSES
EXTERNAL NOSE WIRE No. 12, 5/32 in.

Load Number	0	1	2	3	4	5	5½	6	7
Left, as read	100-180	100-370	50-250	50-365	50-510	50-620	50-680	50-720	50-850
Left, corrected	145	330	430	650	940	1160	1280	1360	1620
Right, as read	100-95	100-180	100-470	50-285	50-395	50-480	50-650	50-650	50-750
Right, corrected	65	145	430	500	710	880	1220	1220	1420

WIRE STRESSES
LIFT CABLES

	Load Number	No. 1 — 5/32 in. As Read	No. 1 — 5/32 in. Corrected	No. 2 — 5/32 in. As Read	No. 2 — 5/32 in. Corrected	No. 3 — 5/32 in. As Read	No. 3 — 5/32 in. Corrected	No. 4 — 5/32 in. As Read	No. 4 — 5/32 in. Corrected	No. 5 — 3/16 in. As Read	No. 5 — 3/16 in. Corrected	No. 6 — 5/32in. As Read	No. 6 — 5/32in. Corrected
Left side	0	100-135	100	0	0	100-160	125	100-175	140	100-100	60	100-225	190
Left side	0	100-135	100	0	0	100-225	190	100-185	150	100- 60	30	100-210	175
Left side	1	100-150	115	100-100	70	100-240	205	100-235	200	100-310	255	100-310	275
Left side	1	100-120	95	100-140	110	100-300	265	100-250	215	100-300	245	100-260	225
Left side	2	100-210	175	100-150	115	100-390	350	100-365	330	100-620	555	100-450	410
Left side	2	100-160	125	100-190	155	100-460	425	100-385	345	100-550	490	100-450	410
Left side	3	100-245	210	100-200	165	100-480	445	100-525	485	50-440	760	50-225	380
Left side	3	100-200	165	100-230	195	50-270	470	100-500	465	50-425	730	50-260	450
Left side	4	100-300	265	100-255	220	50-300	530	50-350	630	40-500	1100	50-390	700
Left side	4	100-250	215	100-290	255	50-360	650	50-370	670	40-470	1025	50-380	680
Right side	0	100- 70	50	100- 70	50	100-130	100	100-165	130	100-150	100	100-130	100
Right side	0	100-130	100	100- 70	50	100- 90	65	100-200	165	100-220	165	100-130	100
Right side	1	100-150	115	100-155	120	100-220	185	100-260	225	100-320	265	100-240	205
Right side	1	100-175	140	100-150	115	100-170	135	100-280	245	100-330	275	100-240	205
Right side	2	100-165	130	100-180	145	100-280	245	100-370	335	100-600	540	100-390	350
Right side	2	100-190	155	100-190	155	100-350	315	100-400	365	100-575	510	100-390	350
Right side	3	100-180	145	100-170	135	100-500	465	100-500	465	50-380	640	100-490	450
Right side	3	100-220	185	100-215	180	100-420	385	100-500	465	50-450	780	100-520	480
Right side	4	100-230	195	100-190	155	50-280	490	50-260	450	40-450	975	50-340	610
Right side	4	100-270	230	100-250	215	50-290	510	50-330	590	40-445	962.5	50-360	640

NOTE:—Column denoted by "Corrected" gives stress obtained from the Calibration Curves for Larson Tensiometer.

WIRE STRESSES
STAGGER WIRES

	Load Number	No. 7—⅛ in. As Read	No. 7—⅛ in. Corrected	No. 8—⅛ in. As read	No. 8—⅛ in. Corrected	No. 9—⅛ in. As read	No. 9—⅛ in. Corrected	No. 10—⅛ in. As read	No. 10—⅛ in. Corrected
Left side	0	100-230	205	100-200	175	100-110	90	100-195	170
Left side	1	100-200	175	100-200	175	100- 95	75	100-205	180
Left side	2	100-200	175	100-160	135	100- 60	45	100-210	185
Left side	3	100-150	125	100-140	115	0	0	100-220	195
Left side	4	100-115	95	100-110	90	0	0	100-230	205
Right side	0	100-120	100	100-330	310	100-190	165	100-160	135
Right side	1	100-100	80	100-320	300	100-210	185	100-270	245
Right side	2	100-125	105	50-140	230	100-170	145	100-170	145
Right side	3	100-210	185	100-260	235	100-110	90	100-175	150
Right side	4	100-215	190	100-220	195	100- 65	50	100-160	135

NOTE:—Column denoted by "Corrected" gives stress obtained from Calibration Curves for Larson Tensiometer.

The port and starboard stagger wires which are in the same relative position were plotted together in order to compare the manner in which they took the load. With the exceptions of port wire No. 7, all slackened up. The curves are nearly parallel thus indicating no local peculiarity. Wire No. 7 led to the fitting at struts No. 2 and No. 10 which moved in such a way as to increase the distance, thus indicating the tension in the wire.

The port nose drift wire took on equal increments in tension stress with each unit load. However, the starboard wire stress followed a curved line with a horizontal step in it, due to the bolt holding the wire clip crashing the deck clamp and elongating the hole. Of course, this relieved some of its load and let the wing back slightly.

Failure

The drift wire terminal on the hull right side started to elongate the hole in the deck clamp at five and a half and six unit loads, as shown in wire tensions obtained and observation of tire clip on hull.

At the sixth load it again took additional stress and continued to do so until spar failure. It is not possible for this bolt to pull out without breaking through the deck clamp due to metal fitting on inside of deck clamp.

About one minute after the jacks had been lowered for the eighth load, failure occurred. The upper rear spar on the right side failed in the inner bay by combined compression and bending. The breaking of the wing spar caused the stress to be carried by the lower forward hinge connection

right side, which spread out, due to cotter pin shearing off and the hinge pin bending. Finally this let go and left wing crashed to scaffolding erected to catch wing at failure.

The outer rear wing strut No. 2 on the right side showed considerable deflection and after the wing test a compression test was made on this member.

Strut fittings on upper rear beam outside struts Nos. 10 and 2, turned loosening the rear lift wires of sets, terminating at these two fittings.

The lower forward left wing hinge pin bent silghtly although no sign of tendency to fail showed up in upper left rear spar inner bay.

A specimen was cut from broken spar near break for the determination of moisture content and specific gravity. The following results were obtained:

Moisture Content	8.9	per cent
Specific gravity	0.359	

The wing structure carried safely a load equal to a factor of seven and failed when the eighth load was applied. This gives a factor of safety of seven plus.

The wing structure showed an ultimate strength of 16.7 per cent plus greater than the factor of safety specified. The machine is deemed to have passed the test satisfactorily with regard to wing structure.

The left hand of the wing structure successfully carried a load equal to a factor of safety of eight.

83.3 per cent of required load for factor of safety of six instead of 80 per cent as per specification was applied before betting the permanent set, because it is not possible to apply unit loads and have 80 per cent on the wing at the same time.

Attention is directed to the support given by the nose drift wire and the importance of this wire.

Characteristics of Model 40 Flying Boat

Type of Machine	Pusher Flying Boat
Overall length	28 ft. 11 3/16 in.
Overall heighth	12 ft. 7 in.
Weight light load	1969 lb.
Weight, full load	2467.5 lb.
Span	48 ft. 6 in.
Total area	501 sq. ft.
Wing curve	R.A.F.-6
Upper Wing	
Span	48 ft. 6 in.
Area	301 sq. ft.
Chord	6 ft. 3 in.
Angle of incidence	3 deg. 5 min.
Dihedral angle	176 deg.
Lower Wing	
Span	37 ft. 8 in.
Area	200 sq. ft.
Chord	6 ft. 3 in.
Angle of incidence	2 deg.
Dihedral angle	176 deg.
Stagger	8 in.
Gap	6 ft. 6 in.
Sweepback	None
Angle of incidence of stabilizer	1 deg. 30 min.
Area of ailerons (2)	58.0 sq. ft.
Area of elevators (2)	25.6 sq. ft.
Area of rudder	17.5 sq. ft.
Area of stabilizer	39.0 sq. ft.
Area of fin	15.0 sq. ft.
Skid fins	None
Engine	Curtiss OXX-6
Horse Power at 140 r.p.m.	90-100 hp.
Propeller, "Falcon" Jamestown	8 ft. 2 in x 5 in.
Tank capacity	39.5 gal.
Fuel consumption lb./Bhp./hr.	0.55 lb.
Load per sq. ft. of area	4.92 lb.
Load in lb./hp.	24.7 lb.
Maximum speed	72 m.p.h.
Minimum speed	42 m.p.h.
Rate of climb (10 minutes)	2600 ft.
Ceiling	8000 ft.
Endurance in hours	4.45 hrs.

French Airplane Industry

The French Chamber of Deputies has appropriated almost 300,000,000 francs for military and commercial aircraft development. Reports just released from the French Chamber of Deputies state: France possessed 120 airplanes of 14 different makes in 1914. There were in France at the time of the armistice (owned by the French government) 11,836 airplanes and 1,264 hydro-airplanes. There are at present 30,000 motors in France. The French Government produced 56,000 airplanes and 3,000 hydro-airplanes during the war. More than 100,000 motors were built. There are now more than 18,000 licensed air pilots in France. Just before the armistice French factories were producing an average of 2,800 airplanes and 4,500 motors per month.

Civil Service Aviation Supply Expert

The United States Civil Service Commission announces an open competitive examination for aviation supply expert on December 8, Grade I, $1,800 to $2,400 a year; Grade II, $2,400 to $3,000 a year. Vacancies in the office of the Chief of Air Service, War Department, at the salaries listed above, and vacancies in positions requiring similar qualificatons, at these or higher or lower salaries, will be filled from this examination, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

The entrance salary within the range stated for either grade will depend upon the qualifications of the appointee as shown in the examination, and the duty to which assigned.

Bonus.—After six months' satisfactory service appointees at annual compensation of $2,500 or less may be allowed the increase granted by Congress of $20 a month.

Citizenship and sex.—All citizens of the United States who meet the requirements, both men and women, may enter this examination; appointing officers, however, have the legal right to specify the sex desired in requesting certificaton of eligibles.

Duties.—The duties of the position consist of the intelligent filling of requisitions; proper distribution, according to type of material, with due regard to location and storage facilities; and estimating for the requirements of the Air Service.

Subjects and weights.—Competitors will be examined in the following subjects, which will have the relative weights indicated:

Subjects.	*Weights*
1. Spelling (twenty words of more than average difficulty)	10
2. Arithmetic (fundamental rules, common and decimal fractions, percentage, and their business application	20
3. Penmanship (the legibility, rapidity, neatness, and general appearance of the competitor's handwriting in the subject of letter writing)	10
4. Letter writing (a letter of not less than 150 words on some subject of general interest. The competitor may select either of two subjects given)	20
5. Copying and correcting manuscript (test in making a smooth, corrected copy of a draft of manuscript which includes erasures, misspelled words, errors in syntax, etc.)	10
6. Training and experience	30
Total	100

Training and experience.—Applicants for Grade I must show that for at least two years they have been employed in military or commercial establishments in positions in which the principal duties involved the handling, distribution, and storage of supplies, the filling of requisitions therefor and the conducting of correspondence and the keeping of records relative thereto.

Applicants for Grade II must show an additional year of such experience.

Special credit will be given for experience in supervising the work of large supply divisions and in the practical handling of storage problems in all Air Service activities.

Classes of supplies.—It is desired to secure eligibles who have handled supplies in one or more of the following classes, and applicants should state definitely which class or classes of materials they have handled.

(1) Airplane, airplane engines and spare parts. (2) Radio supplies. (3) Photographic supplies. (4) Balloon and airship supplies. (5) Small tools. (6) Machine tools. (7) Machinery woodworking and general). (8) Fabrics. (9) Chemicals. (10) Hardware. (11) Aircraft armament. (12) Airplane woods.

Age.—Applicants must have reached their twentieth birthday on the date of the examination.

Pacific Aero Club Membership Drive

The Pacific Aero Club is conducting a membership drive to get more people interested in aviation. It has waived the twenty-dollar initiation fee and is taking in members by allowing them to pay three months in advance. It invites anyone interested in aviation to become a member.

Note on Theories of Screw Propulsion

By Henry C. Watts, D. SC., F. R. AE. S.

The object of this note is to draw attention to a misconception of the theory of screw propulsion which appears in much good work now being done.

This misconception lies in the combination of the Froude inflow theory and the Drzewiecki blade element theory used

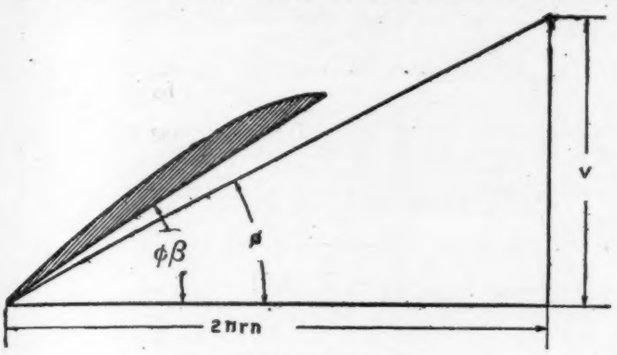


FIG. 1

in conjunction with aerofoil characteristics obtained from tests in an air tunnel.

To explain further one must refer briefly to the various theories which are put forward to account, wholly or partially for the behavior of a screw propeller.

The theory and method of design in use for aircraft propellers is that due to Drzewiecki and modifications of it. The method in its simplest form consists in considering a tangential element of the blade as an aerofoil. Each element has a velocity relative to the air which is compounded of the forward velocity V of the propeller and a tagential velocity v, $= 2\pi rn$ due to its rotation (see Fig. 1). If $\varphi\beta =$ the angle made by the chord of the element with the plane of rotation and $\varphi = \tan^{-1} V/2\pi rn$, then the angle of incidence of the elementary aerofoil to the relative air is $\varphi\beta - \varphi$. Knowing this angle, one can obtain the lift and drag of the element from the tests of the aerofoil in an air channel, and from this data it is a simple matter to deduce expressions for the thrust, torque and efficiency of the element and of the whole blade.

A modification of this method of examination is based on some conceptions due to R. E. Froude. It is supposed in Froude's theory that the propeller is replaced by and is equivalent to a special kind of disc moving at a velocity V relative to the air and having some means of imparting a steady pressure to the column of air passing through it. The column of air is assumed to be of streamline character in the sense that the value $p + 1/2pv^2$ remains constant at all points in the stream.

Under this condition the column of air will be subject to an acceleration for some distance in front of and behind the propeller disc and it is shown by equating the rate of change of momentum to the thrust that one half of the total increased air velocity due to the thrust takes place before the time the air reaches the actuating disc. Hence, if $v =$ total increase in velocity of the air due to the thrust (usually termed the outflow velocity) then the axial speed of the air at the actuating disc or propeller is not V but $V + v/2$.

Dr. Stanton has shown by experiments at the National Physical Laboratory that Froude's assumption as to approximately streamline flow is fully justified as far as the inflow and the passage of the air through the disc is concerned.

At first sight it would therefore appear that in the blade element method the assumption that the axial component of the relative air velocity is equal to the forward speed of the propeller is erroneous, and should be replaced by a value equal to $V + v/2$ or at least by a value equal to $V + xv$ where x is some constant less than unity.

This, however, is the misconception to which reference was made in the opening remarks. The inflow and outflow on a propeller is simply the flow of air caused by the lift and drag reactions on the aerofoil elements. It exists both when the aerofoil is tested in the wind channel or is used in the propeller blade. In the propeller it is a flow turning with the blade which (apart from the blade interference) continues to attack the air at an angle of incidence of $\varphi\beta - \varphi$.

Since no account is taken of the inflow when measuring the angle of incidence of an aerofoil in the air channel, none should be taken in applying the results to the aerofoil in the propeller blade.

Observations such as those of Dr. Stanton might perhaps throw doubt on the idea of a flow turning with the blade for this would mean a varying air velocity while his measurments gave the velocity at any one point as constant and agreeing well with the Froude assumptions.

It must, however, be borne in mind that all Dr. Stanton could measure was the average velocity at any given radius. If, for instance, a full size propeller rotates as 1,200 r.p.m. a model would rotate at about 2,400 r.p.m. The blades would thus pass the point at which measurements were being taken 80 times per sec. In such condition it is easy to see that a liquid manometer connecting the two ends of the pitot tube could only read a mean speed quite different from the real instantaneous speed. In order to measure exactly the real speed of the air at any point in front of or behind the propeller it is necessary to make use of some apparatus whose readings are not affected by the inertia of its moving parts.

M. Drzewiecki has succeeded in making measurements of

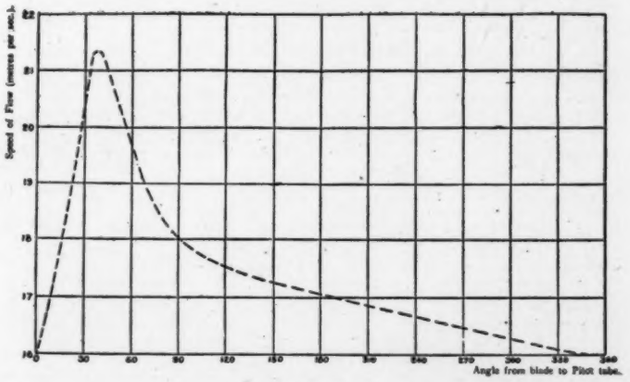


FIG. 2

the real speed at any particular point behind a propeller by use of a strobometer.

This strobometer was connected between the pitot tube, used to measure the velocity, and the manometer. Its function consisted in connecting the two only when the propeller was in a definite position relative to the pitot tube. The manometer being thus connected to the pitot tube once in a revolution and always at the same point relative to the blade, measured the true velocity at that point.

The strobometer was driven by a flexible coupling from the shaft and by adjusting this coupling it was possible to take the pitot tube reading at various positions relative to the blade.

The actual apparatus will be found fully described in M. Drzewiecki's work, "Theorie Generale de L'helice," 1920.

The results of his experiments are interesting and throw light on this question of inflow. One such result is shown in Fig. 2 reproduced from this work.

In this test the pitot tube was placed 30 mm. behind the model at a radius of 300 mm. from the axis of rotation. The model propeller was 400 mm. radius and consisted of a single blade, the centrifugal pull of which was balanced by a counterweight. The angle of incidence on the blade was 3 deg. when the model turned at 1,500 r.p.m. in a channel air

speed of 16 meters per sec. The speed of the air was measured at twenty points on the circle relative to the blade. Fig. 2 was thus obtained.

It will be seen as the blade passes, the speed of air increases rapidly from the channel speed of 16 meters per sec. to just over 21 meters per sec. and then steadily diminishes to the channel speed slightly before the blade completes the revolution.

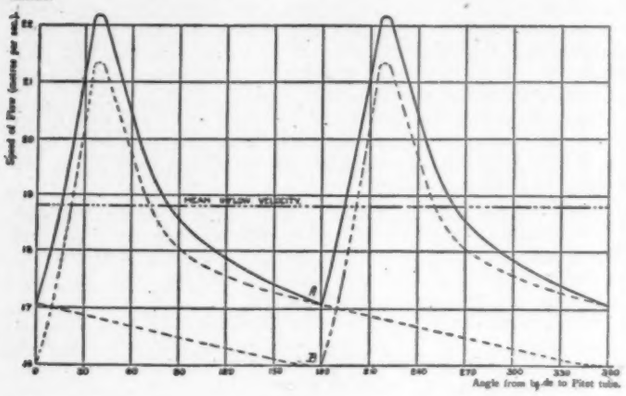


FIG. 3

It is clear, therefore, from this experiment that, in this case at least, the blade is not affected by its inflow. Fig. 2 shows that the blade is always attacking air, the axial velocity of which is the speed of translation only. In Fig. 3 two curves similar to those in Fig. 2 have been superimposed but displaced by 180 deg. This gives an approximation to the variation of speed at a given point behind a two-bladed propeller. Figs. 4 and 5 show the same for a three and four-bladed propeller.

In the case of a two-bladed propeller it will be seen that each blade is attacking air having an axial speed equal to the speed of translation plus a small amount *AB* of the inflow on the previous blade. This amount, for convenience, is called

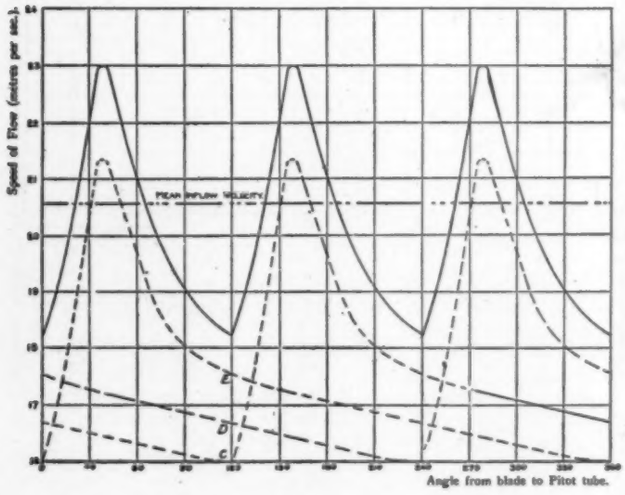


FIG. 4

the interference flow. In the case of the three blades each blade attacks air having a velocity equal to the speed of translation plus the interference flows *CD* and *CE* from the previous two blades.

Similarly with the four blades, any one blade is influenced by the inflow set up by the previous blades, but not by the inflow caused by itself.

In each of the figures the dotted curves show the flow caused by each blade separately and the full curves give the resultant speed variation at the point of measurement. This latter curve is only approximate since the interference flow will have a secondary effect on the inflow and outflow. The chain line gives the average speed, and since the point of measurement was only 0.037 *D* between the plane of rotation, this speed may be considered approximately as the inflow speed.

It is not possible, of course, from this particular experiment to state as a general law the portion of the inflow which should be added to the speed of translation in order to give the true axial speed of air which the blade is attacking. The experiment suggests, however, the fraction cannot be taken as a constant but may vary with other factors such as the number and width of blades.

In the following table the interference flow is shown in column 2 as a fraction of the average inflow velocity, and if we assume that the mean inflow velocity is half the mean

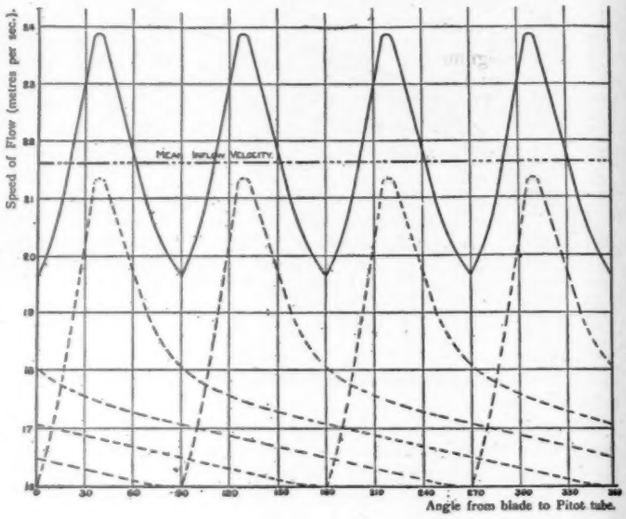


FIG. 5

outflow velocity then column 3 shows the interference flow as a fraction of the outflow.

1 No. of Blades	2 Interference Flow Mean Inflow	3 Interference Flow Mean Outflow
1	0	0
2	0.388	0.194
3	0.532	0.266
4	0.65	0.32
8	0.98	0.49

In Fig. 6 the values in column 2 are plotted against the number of geometrically similar blades.

These values need checking by further experiment before their quantitative values can be entirely accepted. They are,

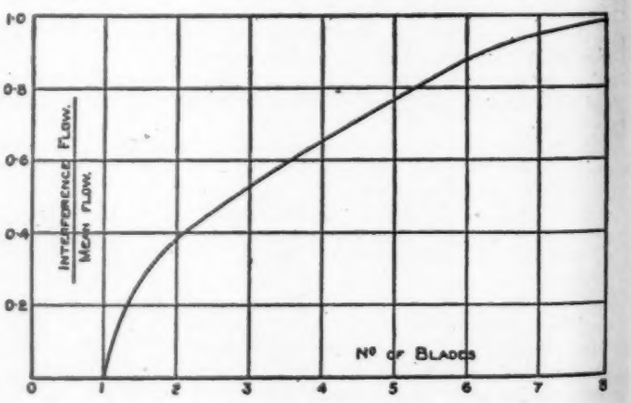


FIG. 6

however, significant, and throw light on what has for some time been a subject of controversy.

They indicate that—

(1) The conception that a propeller blade is influenced by its own inflow is erroneous.

(2) The propeller as a whole is, however, affected by the inflow, but that is due to blade interference.

(3) With a small ratio of total blade width to diameter the simple Drzewiecki is approximately correct, while with a large ratio the inflow theory with the inflow factor of 0.5 is correct. For propellers normally in use a compromise depending on the ratio is justified.

These recent experiments of Drzewiecki also give weight to the idea (often suggested but only recently experimentally tested by R. M. Wood at the Royal Aircraft Factory) that corresponding blade elements of successive blades in a propeller were equivalent to an infinite multiplane with a backward stagger and that blade interference might be corrected for by testing an aerofoil as one of such a multiplane series.—*The Aeronautical Journal.*

Army Air Service Personnel

Recent assignments of Army Air Service personnel include the following: Lieut. Col. James E. Fechet has been detailed as Chief of Training and Operations Group, vice Brig. Gen. William Mitchell appointed assistant chief Air Service. Major John D. Reardon has been detailed as assistant to chief Procurement Division; acting chief, Production Section; acting chief, Inspection Section, Supply Group.

Majors Rush B. Lincoln and John W. Simons, jr., Capt. Maxwell Kirby, members and Lieut. Hubert V. Hopkins, recorder, compose a new board which will consider applications for appointment in the Aviation Section, Signal Officers' Reserve Corps, relieving the board which was appointed April 10, 1920.

Capt. Lloyd N. Keesling has been assigned as education and recreation officer for the Air Service, Washington, D. C. Capt. Frederick F. Christine has been appointed transportation officer of the office of chief, Air Service, relieving Lieut. Earl G. Harper, Inf., transferred. Capts. James F. Doherty and Ralph P. Cousins have been assigned to the Air Service Advisory Board.

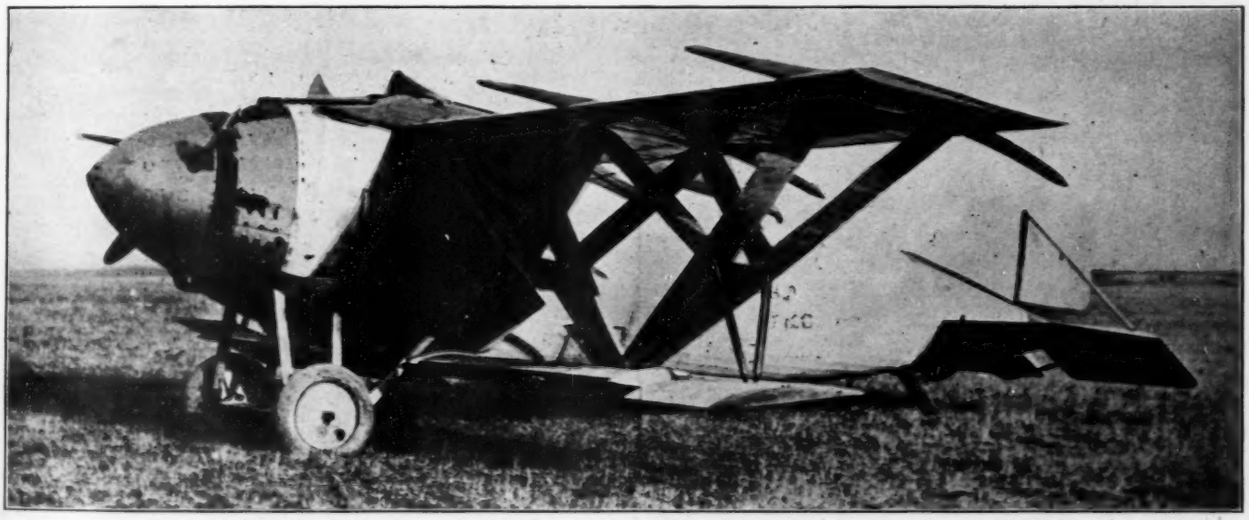
Recent assignments to groups, office of Chief of Air Service, are as follows: Training and Operations, Capt. Henry Abbey, jr., Lieuts. James B. Carroll, William E. Connolly, George W. Goddard, Clifford E. Smythe; Administration, Capt. Horace N. Heison, Lieuts. James E. Duke, jr., Hugh C. Downey, Kenneth C. McGregor, Harold Lee George.

A Variable Surface Airplane

The accompanying illustration shows an extremely interesting French machine, with variable wing, recently flown before the French Technical Section at Etampes.

The machine has its upper plane in three parts, one of which forms part of a fixed biplane truss, while the other two are moveable, one sliding forward and the other backward.

Constructional details are not available at the moment, and it would be interesting to know the way in which loads are transmitted from the movable plane when extended to the biplane truss. No doubt the cambered supports shown in the photograph assist in this transmission of stress.



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A Variable Surface Airplane

The chord of the upper plane is 5 ft. 4 in. when normal, and 10 ft. 8 in. when the movable surfaces are displaced. The center of pressure motion remains unchanged by having one movable part moved forward and the other rearward.

The speed range is from 125 miles to 37 miles an hour. A perfect landing was made on test, with a landing run of only 120 feet.

The plane was designed by Levavasseur and Gastambide and flown by the aviator Grandjean, after whose demonstration of its power it was officially accepted by the commission.

The machine is a 250 hp. biplane of which a new mechanism enables the pilot to vary the wing surface from thirty to fifty square meters and alter his speed from 60 to 200 kilometers an hour. The surface variation is made in the upper plane, which is constructed in three parts. One of these is fixed, but the two others are movable, one gliding forward and the other backward. The center of pressure is kept constant by giving the forward and rear wings a different displacement.

The pilot starting out with the wings at full stretch rose to a considerable height. Then wishing to increase his speed he began contracting the wing's surface. The operation took about a minute, during which time the plane gathered speed until it was flying at 200 kilometers an hour.

When he wished to land, the pilot again increased the surface and glided down gently at 60 kilometers an hour and made a perfect landing. The arrangement of the rear wing of the upper plane enables the pilot, at the same time as he expands it, to alter the angle of incidence.

Military experts who saw the exhibition declare themselves well satisfied that a great step is made by the invention toward securing safety of landing of an airplane which can at the same time be capable of great speed. The mechanism is claimed to be both simple and strong and the trials carried out did not develop any faults.

Annual Meeting of the Aero Club of America

The eleventh annual meeting of the Aero Club of America took place at the club house at 11 East 38th street, New York on November 8. Three hundred and eighty-five members of the club were present in person or by proxy. The meeting was held in the dining room, and which was filled by the seventy members who were present in person.

The meeting was opened by Charles Jerome Edwards, the first vice-president, in the absence of the president who was delayed. Jefferson deMont Thompson, the president later took the chair. The first in the order of business was the reading of those sections of the by-laws calling the meeting and the affidavit of the secretary concerning the sending of the prescribed notices. The minutes of the last annual meeting and of the special meeting of August 16 were read and approved. The proxy committee made its report which was approved.

The new business consisted of a set of amendments to the by-laws which were presented by Prof. Charles Lane Poor. For the most part they consisted in changes of phraseolgy and were intended to bring the by-laws in harmony with the changes made by the consolidation with the American Flying Club and to remove any of the specific provisions of the special meeting in August.

Two sections of the by-laws were somewhat radically changed. The first provided for an increase in the number of governors Class B from six to nine. The intention is to allow more sections of the country to be represented on the board of governors. Some discussion ensued on this point. The opinion was expressed that other sections of the country believed that the Aero Club of America was attempting to concentrate aviation in New York. Other speakers said that the real and original function of the club was to represent the entire United States, as is indicated in the name.

The second radical change consisted of a complete change of the chapter of the by-laws relating to discipline. The changes were discussed at the meeting in August but could not be incorporated at that time owing to the sections of the by-laws relating to the notification of members. The chapter as amended reads as follows:

"Section 1. At any regular or special meeting of the board of governors, by a vote of three-fourths of the governors present at such meeting, any member, against whom charges have been made, may be suspended or expelled from the club for any cause considered, in the judgment of the board, as being inimical to the welfare or best interests of the club; provided, however, that a copy of the charges shall have been mailed to the address of such member as it appears upon the records of the club at least ten days prior to the date of the meeting, and that, at such meeting, he be given an opportunity to be heard thereon.

"Sec. 2 At any regular or special meeting of the house committee, by a majority vote of the members of the committee, any member of the club may be suspended from any or all privileges of the club house for a period not exceeding six months for any infraction of the house rules or for conduct, within the club house, deemed inimical to the welfare or best interests of the club; provided, however, that a copy of the charges against such member shall have been mailed to his address as it appears upon the records of the club at least five days prior to the meeting of the committee, and that at such meeting, such member shall be given an opportunity to be heard thereon."

A further section of the amendments that was commented on, was the section relating to the election of the officers. The objection raised was that the members of the club had no direct voice in the election. Mr. Miller made a plea for the support of the club in the governors that they elected.

The principal change involved is the addition of provisions requiring that the person under charges be sent a copy of the charges and that he be given a hearing at the meeting at which his case is taken up.

The amendments were voted on as a whole and were passed by a large majority.

After the polls were closed, the tellers reported that the following members were elected governors:

Governors, Term expiring November, 1921:—William W. Miller, Professor Charles Lane Poor, Henry A. Wise Wood, James A. Blair, Jr., Jefferson DeMont Thompson and W. Redmond Cross.

Governors, Term expiring November, 1922:—Cortland Field Bishop, Benjamin F. Castle, Philip A. Carroll, Caleb S. Bragg, Arthur A. O'Brien and William A. Larned.

Governors, Term expiring November, 1923:—Douglas Campbell, Maurice G. Cleary, Philip J. Roosevelt, Charles Jerome Edwards, F. Trubee Davison and Charles E. Merrill.

Governors, Class B:—Louis D. Beaumont, Godfrey L. Cabot, Howard E. Coffin, Benedict Crowell, Rear-Admiral B. A. Fiske, U.S.N., Charles J. Biddle, Albert J. Lambert, George M. Myers and Howard S. McCormick.

After the announcement of the elections the various committees of the club presented their annual reports. Each of these reports caused some discussion. The general tone of the speeches was an expression of a universal desire to make the Aero Club of America a big force in aviation and for the members to work in harmony to achieve this end.

The election of the officers for the coming year did not take place immediately after the meeting as formerly but will take place in the near future. This change was brought about by one of the amendments to the by-laws passed at the meeting.

Lincoln Standard Carries Six

Establishing a new short flight passenger airplane record for California, Pilot Michael Brown, chief instructor of the Varney Flying Field at Redwood City, took five passengers, whose combined weight with his own was 975 pounds, on a flight over Redwood.

In five minutes Brown reached an altitude of 1000 feet, turning and banking his machine with the wind at an altitude of 700 feet.

The plane used was a Varney Lincoln-Standard, prepared by Walter T. Varney for the special trip. Brown was one of the first civilian instructors to enter the government service during the war at Rockwell Field, San Diego.

Here is a list of the passengers and their weights:

L. Jackson, 145 pounds.
M. Brown, 195 pounds.
Lieutenant B. Doolin, 155 pounds.
V. Rynning, 155 pounds.
W. B. Selimer, 160 pounds.
C. Strother, 165 pounds.
Total, 975 pounds.

In addition to the pilot and passengers, the plane carried fifteen gallons of gas, weighing ninety pounds, and five gallons oil.

German Companies Record

The *Berner Tagblatt* (Berne) for September 10, gives a resume of the results obtained by the Deutsche Luftreederei This company, started in May, 1918, by the Allgemeine Electrictats Gie. with a capital of 2,500,000 marks, has the following equipment: 40 postal machines, 10 seaplanes, 3 giants (suitable for bombing) and 2 lighter ones.

The total flights made since the armistice amounts to 5,300 with a total of 510,000 miles covered.

This company expects to organize in the near future, the Commercial circuit of the North-West with landings at Copenhagen, Malmo, Warnemunde, Hamburg, Bremen, Amsterdam and London.

Makes Fast Time

Travelling in a new flying boat, which he had just purchased in this country, Col. W. G. Barker, V. C., made a fast trip from Albany to Montreal on October 2. He covered the distance of approximately 300 miles in two hours and five minutes.

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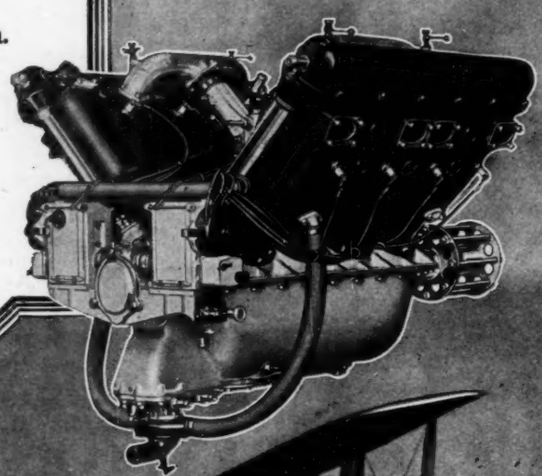

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Seattle-Victoria Air Mail in Operation

The contract awarded by the Post Office Department to Edward Hubbard, formerly of the Boeing Airplane Co., is being carried out. The contract called for a maximum of ten trips a month. As the operation of the service began on October 15, only five trips were made. Hubbard is using two Boeing machines; one twin float seaplane equipped with a Hall-Scott L-4 and a flying boat equipped with a Hall-Scott L-6. He uses the machine which is more suited to the load on that particular trip, keeping the other machine in reserve. The American terminus is the Boeing hangar on Lake Union. This service is paid for entirely by the United States government, the Canadian Post Office taking no part. Hubbard is required to deliver the mail to the steamers at Victoria but the civic authorities have promised to provide a proper float.

All of the trips in October were made in bad weather, some of them after dark. The mail in all instances has been advanced at least 24 hours. In the case of letters mailed after the regular service by train or steamer has left, they are advanced at least two weeks to the Orient, as otherwise they would have to wait for the next steamer.

The Boeing Airplane Co. as announced, in connection with the start of this service, that they have retired from the commercial operation of airplanes and will in the future confine their activities to manufacture.

San Diego May Have Aerial Mail

With a view to establishing aerial mail service between San Diego and New York, John A. Jordan, chief of construction of United States aerial mail service, made an investigation in San Diego of conditions. The service, if found feasible by Jordan, will be a 52-hour service between San Diego and New York and will be by way of an air route from San Diego to the transcontinental mail terminal at San Francisco. He made the investigation under the direction of the postoffice department.

The commercial flying field at Dutch flats and landing facilities there were looked into by Jordan. He said that he was there merely to investigate the physical factors of the proposed route and to report to Washington. Then, according to Jordan, it will be up to the congressman from there, the chamber of commerce and the citizens to bring pressure to bear to secure the service. He said he thought San Diego could get it if these representatives speak right up.

The aerial mail service so far has been remarkably satisfactory, Jordan says, and an average of 94 percentage perfect was maintained last year, although much of the flying was around the great lakes, where conditions are bad.

F-5-L at the Smithsonian Institute

The Navy Department has loaned a completely equipped F-5-L flying boat to the Smithsonian Institution for exhibition purposes. This aircraft has been cut away in such a manner as to enable those viewing it to understand clearly all the details in connection with its construction, assembly and operation. Shipment was made by truck from the Washington Navy Yard to the Smithsonian Institution, and the boat was assembled by personnel from the U. S. Naval Air Station, Anacostia, D.C.

This type of flying boat is one of the most interesting and instructive which could have been placed on exhibition. Some of the greatest achievements of American Naval Aviation have been executed with this type of craft.

Enlisted Men as Flying Cadets

Due to complaints from primary flying schools that care has not been exercised in the selection of enlisted men for detail at these schools as flying cadets, Air Service headquarters had called atention of commanding officers to the fact that the men selected should be potential commissioned officers of the Air Service. The selection of men who do not measure up to this standard and who are later sent to flying schools usually results in their failure. These failures result in unnecessary expense to the Government and have an adverse effect upon the working staff of the schools to which they are sent.

An Exhibition at Los Angeles Races

Arrangements were completed recently for an aero exhibition under the auspices of the Aero Club of Southern California in connection with the national championship automobile races Thanksgiving Day at the Los Angeles Speedway. This is in addition to Barr's flying circus, already announced on the Speedway program by Manager Dick Ferris. The aero exhibition will show the latest types of aircraft.

Several large airplanes of the newest commercial designs, both for passenger and freight carrying, are being constructed in Los Angeles factories.

One, which is being rushed in order to be in the air by Thanksgiving Day, will carry a ton of freight on a flight of 1000 miles, and the Aero Club has promised Mr. Ferris that it will be entered. Another which is expected to show a new mark in flying efficiency will be registered as an entry if the owner decides to retain it in Los Angeles.

The public will be admitted to the infield of the Speedway from 8 to 1 o'clock. Facilities will be afforded for close examination of the new types of machines. The field will be cleared at 1 o'clock for the flying circus, and the championship automobile races will begin at 2 o'clock.

San Francisco Naval Base to Be Inspected from Air

Inspection from the air of naval base sites on San Francisco bay is contemplated by the naval base committee of the Oakland, Calif., Chamber of Commerce for the congressional committees due there on November 16.

The Durant fliers have mapped out an air trip which will cover the sites at Almeda, Hunter's point, and Carquinez straits in forty-five minutes, and Major Reed Chambers, manager of the Durant Aircraft Corporation, has invited W. W. Chapin, chairman of the committee, and J. R. Knowland, a member of the committee on arrangements, to take a test flight.

Major Chambers has proposed that as many as possible of the senators and representatives be induced to take the trip and has given assurances that with six new "ships" which his company will have about the first of the month the entire party of ten can be shown all of the sites in an hour and a half.

"I have already flown over the three sites," the major said today, "and am preparing to make more flights to take photographs. In my opinion, after viewing the sites from the air, there is nothing to it but Almeda."

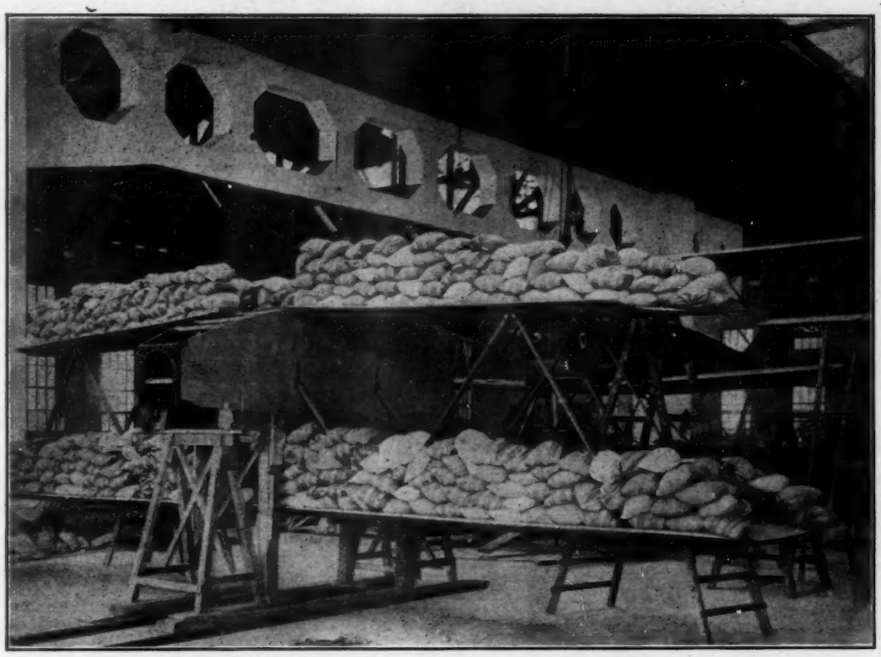
Appointment of Army Flying Cadets

Pending the publication of regulations, governing appointments in the Officers' Reserve Corps, the War Department has stated a policy which is to be observed relative to the appointment of flying cadets as Reserve officers. About one month prior to completion of training, cadets will be examined as to their fitness for appointment in the Reserve Corps by a board of three officers, one of whom will be a medical officer, convened by the commanding officer of a flying field. Reports from the various boards, whether favorable or unfavorable to the cadet, will be forwarded through the Chief of Air Service to the War Department. Appointments in the Officers' Reserve Corps will be made in sufficient time so that the cadets may receive such appointments on the date of completion of their flying training. Cadets who are under twenty-one years of age at completion of training will be appointed on attaining that age.

M. R. Saulnier Visits This Country

M. Raymond Saulnier, Chevalier of the Legion of Honor, and president of the Societe Morane Saulnier of France arrived in the United States on November 1. The purpose of his trip is to complete the negotiations for the manufacture of Morane Saulnier airplanes in this country. The Morane Saulnier firm is one of the large airplane manufacturers in France and has gone ahead with the production of civil models. The aviator Fronval recently flew a Morane Saulnier type AR with the elevator and aileron controls locked, using only the rudder and throttle.

ANSALDO AEROPLANES S. V. A.



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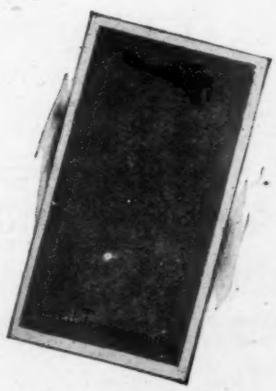

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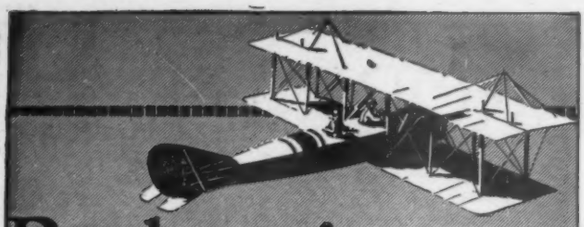

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INDEX TO ADVERTISERS

A

Aero Import Corp..... 301
Aeromarine Plane & Motor Co..... 280
Aircraft Service Directory..... 306
Aluminum Company of America..... 302

B

Baker Castor Oil Co..... 302
Barker, F. W..... 303
Brewster-Goldsmith Corp..... 305

C

Climax Molybdenum Co..... 278
Curtiss Aeroplane & Motor Corp..... 282

D

Dayton Wright Co..... 279
Doehler Die-Casting Co..... 303

E

Edstrom Machinery Co..... 305

F

Flottorp Manufacturing Co..... 303

G

Grand Rapids Veneer Works..... 303

H

Hall-Scott Motor Car Co..... 303
Hamilton Aero Manufacturing Co..... 302
Home Insurance Co..... 307
Howard, Raymond M..... 304

J

Johns-Manville, Inc..... 302

L

L-W-F Engineering Co., Inc..... 307

M

Martin, The Glenn L., Co..... 308

P

Philadelphia Aero-Service Corp..... 304
Pioneer Instrument Co..... 304

T

Thomas-Morse Aircraft Corp..... 281

W

Wellington, Sears & Co..... 303
West Virginia Aircraft Co..... 303
Wright Aeronautical Corp..... 299

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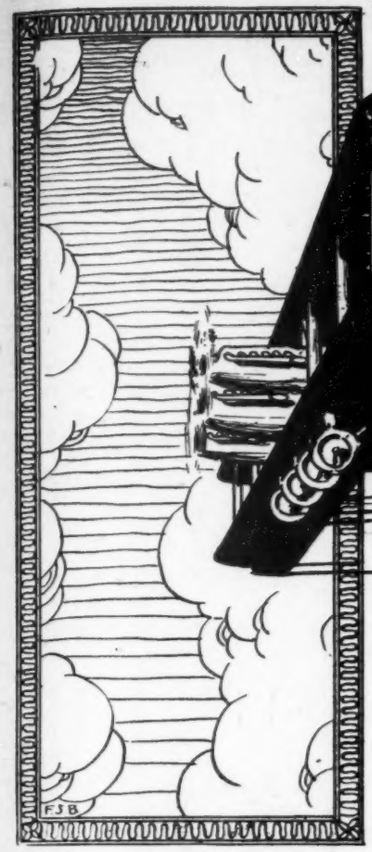

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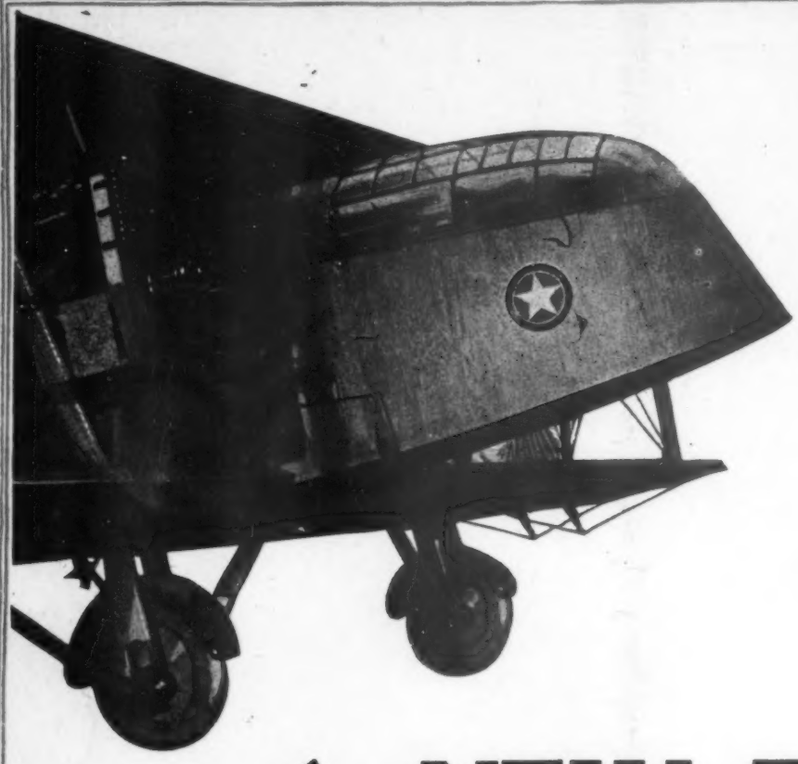

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